

# LOGIC DEDUCTION

BY

A. SUBRAHMANYAM, B.A., L.T.,  
*Assistant Professor of Mental and Moral Science,  
Presidency College, Madras, and the author of  
"The Philosophy of Aristotle."*

Second Edition—Rewritten and Enlarged.



Madras:  
SRINIVASA, VARADACHARI & CO.

1903.

[All Rights Reserved.]



MADRAS:  
PRINTED BY SRINIVASA, VARADACHARI & CO.,  
MOUNT ROAD.

## PREFACE TO THE SECOND EDITION.

---

THIS edition has almost nothing in common with the first except the general outline of logical doctrine. The first edition was published in 1885 for the use of the students preparing for the F.A. examination of the Madras University when Logic had to be studied by them for that examination. It was hence of an elementary character. A year or two later, when the necessity arose for a second edition, the subject of Logic was removed from the F.A. course altogether, though, in the opinion of some, its culture-value ought to have secured for it a position at least as an alternative subject. In consequence of its removal from the curriculum, I then gave up the idea of bringing out a second edition of the book. But my subsequent experience as a teacher of the B.A. classes led me to think that a small volume of the kind that is now presented for public acceptance would be of some service to the

students preparing for the B.A. examination. Accordingly, I amplified and re-wrote the work, carefully presenting all that is necessary for the student in such form and order as would render the study of the subject easy and interesting. I venture to think that the work will be found useful in securing the end I have had in view, inasmuch as it will enable the student to obtain the required knowledge of the subject without his having to undergo the labour of sifting and gleaning. Though the book has been written in accordance with the B.A. syllabus of the Madras University bearing on this subject, yet it is hoped that, from its sufficiently comprehensive character, it will be of use to all that are interested in the study of Logic. All the traditional views on logical doctrine have been fully expounded, and all questions of a controversial character have been freely discussed; and it is hoped that the readers will find here and there some freshness in the manner of treatment. Ample exercises have been appended to most of the chapters in Books II, III and IV. As a further help to students, the questions set for the B.A. exam-

ination of the Madras University during the last 23 years are also given at the end of the book.

In the preparation of this book, I have consulted the works of Dr. Keynes, Dr. Bain, Mr. Welton, Mill, Minto, Dr. Read, Mr. Bradley, Dr. Venn, and a few other logicians. Some interesting problems and exercises have been taken from Dr. Keynes' Formal Logic, and solutions have been given to the more difficult among them. Suggestions for the improvement of the work will be thankfully received.

TRIPPLICANE,  
18th January 1903. }

A. SUBRAHMANYAM.





# TABLE OF CONTENTS.

---

## BOOK I.

### INTRODUCTION.

#### CHAPTER I.

##### *THE PROVINCE AND UTILITY OF LOGIC.*

SECTION.	PAGE.
1. Derivation and history of the word "Logic" ...	1
✓ 2. Is Logic a Science or an Art? ...	2
3. Relation of Logic to other sciences... Logic and Psychology ...	5 6
Logic and Metaphysics... Logic and Rhetoric ...	7 7
✓ 4. Logic and Grammar ...	8
✓ 5. Definition or Scope of the Science... Utility of Logic ...	8 14

#### CHAPTER II.

##### *PHENOMENA WITH WHICH LOGIC DEALS.*

1. Phenomena with which Logic deals ...	17
2. Relation between Thought and Language ...	19
3. Use and abuse of Language ...	22

## CHAPTER III.

*PRINCIPAL DIVISIONS OF LOGIC.*

SECTION.		PAGE.
1.	Simple Apprehension, Judgment and Reasoning.	25
2.	Dr. Bain's enumeration ...	27
	(1) Observation and Experiment ...	28
	(2) Definition ...	29
	(3) Induction ...	31
	(4) Deduction ...	34

## BOOK II.

## NAMES AND CONCEPTS.

## CHAPTER I.

*NAMES AND THEIR IMPORT.*

1.	On the necessity of an Examination of Names...	41
✓2.	Terms and Names ...	42
✓3.	Import of Names ...	44

## CHAPTER II.

*CLASSIFICATION OF NAMES.*

✓1.	General remarks on Terms and Non-terms.	
	Categorematic and Syncategorematic words ...	48
✓2.	General and Singular ...	50
✓3.	Abstract and Concrete... ..	57
✓4.	Connotative and Non-connotative ...	63
	(a) The meaning of Connotation... ..	65
	(1) Conventional intension.	
	(2) Subjective intension.	
	(3) Objective intension.	
	(4) Ultimate and independent intension.	

# TABLE OF CONTENTS.

xi

SECTION.	PAGE.
✓ (b) The meaning of Denotation ...	67
✓ (c) The mutual dependence of connotation and denotation ...	68
✓ (d) Are Proper Names connotative ?	72
(e) Are Abstract Names connotative ?	76
✓ 5. Positive and Negative terms ...	76
✓ 6. Relative and Non-relative or Absolute	83
✓ 7. Univocal and Equivocal	86
Examples ...	87

## CHAPTER III.

### AMBIGUITY OF TERMS.

1. General remarks ...	89
2. Ambiguity : its nature and origin ...	90
3. Ambiguity : its remedies ...	100

## CHAPTER IV.

### CONCEPTS.

1. Formation of concepts ...	102
2. Character of concepts ...	105
3. Perfection and Imperfection of concepts	107
4. Grades of Generality ...	110

## CHAPTER V.

### THE PREDICABLES—VERBAL AND REAL PREDICATION.

✓ 1. Definition of Predicables ...	114
✓ (a) Genus and Species ...	115
✓ (b) Differentia ...	117
✓ (c) Proprium ...	119
✓ (d) Accidens ...	121



SECTION.	PAGE.
2. Verbal and Real Predication ...	123
3. Definition ...	127
4. Division ...	134

## BOOK III.

### PROPOSITIONS.

#### CHAPTER I.

##### *DIFFERENT KINDS OF PROPOSITIONS.*

1. Sub-divisions on the basis of Relation ...	141
2. Analysis of the Categorical proposition ...	143
3. The quantity of Propositions—	
Universal and Particular ...	145
Indefinite and Singular propositions ...	150
4. The quality of Propositions. Affirmative and Negative ...	152
5. The distribution of terms in a proposition ...	156
6. Complex and Compound propositions ...	159
<i>Complex propositions which are explicative, and those which are determinative.</i>	
<i>Compound propositions which are (a) Copulative propositions, (b) Remotive propositions, (c) Discretive propositions, (d) Exponible propositions, (e) Exceptive propositions, and (f) Inceptive and Desitive propositions.</i>	
Exclusive propositions ...	162
7. The modality of propositions ...	163
8. Hypothetical propositions—	
(a) Their nature ...	164
(b) The relation of Hypothetical to Categorical propositions ...	167

# TABLE OF CONTENTS.

xiii

SECTION.	PAGE.
(c) Quality and Quantity of Hypothetical propositions ...	172
9. Disjunctive propositions—	
(a) Their nature ...	172
(b) Their import ...	173
(c) Their relation to Hypothetical propositions.	175
(d) Quality and Quantity of Disjunctive propositions ...	176
Examples and Exercises.	

## CHAPTER II.

### *MODERN ADDITIONS TO PROPOSITIONAL FORMS.*

1. Those arising from the quantification of the Predicate—	
(a) The forms and their symbols...	178
(b) The advantages claimed for the doctrine ...	179
(c) Objections ...	180
2. Those arising from the full recognition of contraries ...	184

## CHAPTER III.

### *MODES OF NOTATION.*

1. The criteria of good notation ...	187
2. Euler's scheme ...	188
3. Lambert's scheme ...	191
4. Dr. Venn's scheme ...	193

## CHAPTER IV.

### *THE OPPOSITION OF PROPOSITIONS.*

(1) Contrariety ...	195
(2) Contradiction ...	196

SECTION.	PAGE.
(3) Sub-contrariety ... ..	198
(4) Sub-alternation ... ..	199
(5) The squares of Opposition ... ..	200
(6) Inference by Opposition ... ..	201
(7) Opposition of quantified propositions ... ..	204
Examples and Exercises.	

## CHAPTER V.

*IMMEDIATE INFERENCE.*

1. Immediate inferences from Categoricals—	
(1) Greater to less in denotation...	210
(2) Greater to less in connotation	211
(3) Obversion ... ..	211
(4) Conversion ... ..	216
(5) Obversion of the converse ... ..	223
(6) Contraposition, or Conversion of the obverse ... ..	223
(7) Obversion of the contrapositive ... ..	225
(8) Inversion ... ..	226
(9) Obversion of the inverse ... ..	229
(10) Added Determinants ... ..	230
(11) Complex Conception ... ..	231
(12) Synonymous propositions ... ..	232
2. Immediate inferences from Hypotheticals	232
3. Immediate inferences from Disjunctives	234
Exercises.	

## CHAPTER VI.

*THE IMPORT OF PROPOSITIONS.*

(1) The Denotative-Connotative or the Predicative view ... ..	238
---	-----

# BOOK I.

## INTRODUCTION.

---

### CHAPTER I.

#### THE PROVINCE AND UTILITY OF LOGIC.

1. Derivation and history of the word "Logic."  
—Logic is derived from a Greek word (*logos*) which denoted in that language both thought and its expression. It was ambiguous, denoting both what *ratio* and *oratio* mean in Latin. This ambiguity in the word *logos* gave rise in subsequent times to a difference of opinion among logicians with regard to the phenomena with which Logic deals, the question being whether Logic deals with language, thought, or objects. Aristotle removed the ambiguity by calling *logos*, meaning *thought*, by a phrase which means *that within* or *that in the mind*, and *logos*, meaning *speech*, by another which means *that without*. The same distinction was afterwards expressed by others by two phrases in both of which the word *logos* appears. They apparently retained the word '*logos*', and obviated the ambiguity by using restrictive expressions. The two phrases correspond to *verbum mentis* and *verbum oris* in Latin. *Logos*, however, is not the word from which Logic is directly derived. It is to its derivative, *logiké*, that we must



trace its direct origin. The remnant of *logiké* after removing the ending, is exactly our word Logic. Sir W. Hamilton tells us that Aristotle, to whom the credit of having first fully developed the science is due, did not designate it by the term *logiké*, but that he uses the adjective *logikos* in various combinations with other substantives. By whom the term *logiké* was first introduced to designate the science, is not known. Originally an adjective, the term *logiké* came subsequently to be employed absolutely as the name of the science, and we may observe a similar change in use in the case of the terms 'Mathematics,' 'Mechanics,' &c.

2. Is Logic a Science or an Art?—This question is easily solved if we first consider the distinction between Science and Art. A Science is a systematic body of principles or general laws investigated and established in relation to a particular department of nature. The knowledge of an isolated fact is no scientific knowledge; the fact must be known in all its relations to the other facts of the department to which it belongs. While Science is a systematised body of principles relating to some special subject-matter, Art is the application of such principles in practice. Further, the principles applied in Art are not generally principles relating to one department of nature, but principles derived from several departments. Mathematics is a Science, and its principles relate only to one department, *viz.*, quantity and number; but Navigation, which is an Art, derives its principles for application from Mathematics, Astro-

onomy, Mechanics, Optics, Meteorology, &c. Scientific investigation aims at truth; while the application of a body of principles in Art aims at utility. While the distinction between Science and Art is theoretically sound, it is difficult practically to draw a clear line of demarcation between the Sciences properly so-called and the Arts. The distinction is sometimes drawn between the Theoretical Sciences such as Mathematics, Chemistry, Psychology, &c., and the Practical Sciences, such as Navigation, Agriculture, Politics, &c., the former conforming to the strictest definition of Science, and the latter to that of Art. It must, however, be noted that in the practice of the Arts, the knowledge that is available is sometimes scientific, and sometimes purely empirical. An empirical Art proceeds on the knowledge gained in the exercise of the Art itself. All Arts were empirical before Science came in; the greater part of medicine still remains an empirical Art. When, however, an Art is founded on scientific principles, then it may be called a Scientific Art, or a Practical Science. In a Practical Science, the knowledge is selected from one or more Theoretical Sciences and arranged in the order suited to the end in view.

Now, what is Logic? There is no doubt that it is a Science, because it investigates the natural principles that regulate the reasoning faculties of mankind. It teaches those principles by which the cogency of reasonings can be tested. Such principles are uniform and constant. Given that the greatest thinker of the 19th century was a Socialist, and that J. S. Mill

was the greatest thinker of that century, the conclusion is inevitable that J. S. Mill was a Socialist. All who rightly reason must draw this conclusion. Again, in Logic we have not merely a body of principles which underlie all forms of valid reasoning, but the very same principles furnish us also with guidance for avoiding and detecting errors in reasoning. The latter certainly is no mean part of the function of Logic. We make very large application of the principles of theoretical logic for the purposes of correct reasoning and discussion, and for detecting fallacies in argumentation. It not only investigates the universal forms of valid reasoning, but it also helps persons to avoid and detect fallacies in reasoning. Thus it has distinctly a practical side as well as a theoretical side. We may, therefore, call Logic both a Theoretical Science and a Practical Science.

Logicians have expressed themselves variously on this question. Some have called Logic an Art, attaching little or no importance to the theoretical aspect of it. Aldrich, for example, has defined it as the "Art of Reasoning." Mansel, on the other hand, has held that, in its essence, it is speculative or theoretical, and only in its accidents, practical. According to him, even if no persons existed requiring the use of the logical principles for the correction of their reasoning faculties, or, even if nobody cared to do so, the logical principles would still remain the same. But it may be said that these principles would not have come into existence but for the utility which they distinctly subserve. To suppose a race of intelligent

beings incapable of transgressing the principles of logic, and hence of knowing what error is, is to commit the fallacy of Relativity. To appreciate correct reasoning we must know what is incorrect reasoning. Whately, like the early Greek writers, has emphasized both the theoretical and the practical character of Logic, as also J. S. Mill and others of his following.

### 3. Relation of Logic to other Sciences.—

This science is the most fundamental of all the sciences, and its principles are employed more or less perfectly in daily discourses and writings. It is the true judge of the sufficiency of facts or principles as evidence to prove the truth of a statement in any department of knowledge, and this recommendation in its favour has secured for it the names, "The Science of Sciences," and "The Art of Arts," first employed by Duns Scotus of the 13th century; and this high place given to it is happily illustrated also by the names of the various sciences, such as Physiology, Psychology, Biology, Sociology, Mineralogy, Zoology, Theology, &c. These mean logic applied to the study of the phenomena belonging to the respective departments. Physiology means logic applied to the study of the functions of life; Psychology means logic applied to the study of the mental phenomena; and so on. Following this plan of naming, we may give the name Logology to our present science. Certain forms of reasoning and certain methods have to be adopted for arriving at truths in all departments of knowledge, and the science which formulates these forms and methods is Logic. This has



also gained the name of "The Lighthouse of the Intellect," inasmuch as all the intellectual operations are directed and regulated by this science alone. Other names, such as, "The Head and Crown of Philosophy," "The Key of Wisdom," &c., also show that a high place has been conceded to it by eminent men. The principles of Logic and Mathematics are equally applicable to all the sciences; but Logic ranks even higher than Mathematics in point of generality and abstractness as its principles are applicable to Mathematics as well as to the other sciences.

*Logic and Psychology.*—Apart from the fact that Logic bears to all the sciences the general relation above sketched out, it bears a closer relation to Psychology and a few other sciences. Psychology is the science which deals with the phenomena of mind, namely, feelings, volitions, and thoughts. But Logic has nothing to do with feelings and volitions. Thus Logic is narrower than Psychology, though in the sense in which its principles and methods must pervade all the sciences, it is wider than that science. Again, even with reference to thoughts, while Psychology deals with the laws of the actual rise and development of thoughts in general, with the processes and products of thought generally, i.e., of every species of thought, perceptual, conceptual, reproductive, constructive, &c., Logic deals only with Reasoning, along with concepts and judgments which are subsidiary to Reasoning. And lastly, while Psychology gives an account of the laws of reasoning in the sense of uniformities, i.e., laws in accordance with which men are found by actual

experience to reason, Logic is *regulative*, and affords criteria for discriminating valid reasoning from the invalid. Logic does not concern itself with all the ways in which men actually reach conclusions, with the modes in which, through association of ideas or otherwise, one belief generates another; but it concerns itself with the conditions of *valid* reasoning only, with the theory of the ascertainment of truth.

*Logic and Metaphysics.*—Metaphysics discusses *Being* as such. The pillar that stands before me possesses various qualities, colour, size, shape, &c., and these are all perceivable by my senses. Metaphysics asks, does there exist behind these qualities any *entity* which binds them together and which alone has real existence? Similarly, does there exist an *entity* behind all the mental manifestations? Does there exist God? Metaphysics discusses the ultimate realities of the things about which we reason, so that, if it succeeds in determining their true nature, it will throw immense light on the principles of reasoning which Logic investigates. The relations between things implied in all reasoning can be better understood when the realities of the things are known. But Logic assumes that the things of the phenomenal world are for all practical purposes real, and builds its theory upon that practically valid assumption, without waiting for the decision of Metaphysics.

*Logic and Rhetoric.*—The Logician's discourses are founded on principles which aim at producing conviction, while the Rhetorician's discourses are founded

on principles which aim at persuading people by stirring up their emotions, or appealing to their fond prejudices. The one appeals to the intellect and the other to the emotions. The two sciences are thus both connected with Psychology.

*Logic and Grammar.*—Grammar discusses the laws of language as expressive of thought, while Logic deals with thought as expressed in language. Logic concerns itself with language, only as the instrument of thought; and even with thought, only as the thought of a thing. It does not take account of the analysis of language into the various parts of speech, but it recognises only those forms of words or combinations of words which can express single objects, or classes of objects. All non-significant words which do not express complete ideas and which cannot thus stand by themselves as terms, are disregarded by Logic. In every proposition, the logical predicate is the whole assertion made of the subject, while the grammatical predicate is merely what is contained in the finite verb. Logic merely analyses the two concepts related in the proposition, while Grammar undertakes to show the function of each word in the sentence.

4. *Definition or Scope of the Science.*—The definition of any progressive science can only be provisionally stated. It must be improved as the science advances. What definition a particular logician gives of Logic depends upon what he considers to be the essentials of the science. These have been conceived differently, and there has hence been much diversity in the modes in which Logic has been defined

by the several logicians. Aldrich, whose book was used as the text in the Oxford University, defines Logic as the Art of Reasoning. Whately, whose treatise was decidedly an improvement on Aldrich's, defines it as the Science and also as the Art of Reasoning. Whately no doubt recognises the fact that the practical function of Logic has a scientific basis; but Reasoning is an ambiguous word. With some it means Deduction only, while with others, such as Mill, and Dr. Bain, it means both Deduction and Induction. In most logical treatises, such as those of Whately, Hamilton, Thomson, &c., Logic has been understood in the narrower signification, but in all of them matters pertaining to Induction have been introduced either under the title of Induction, or as Applied Logic. Even when it is understood in its widest sense in these definitions, it excludes Classification, Definition, and Division, so that neither of these definitions will do, if we mean to recognise these as parts of Logic; and we must recognise these as parts of Logic, because, as we shall see further on, these are the sole means by which we can furnish ourselves with ready materials classified and arranged in order to enable us to see at once what kind of relation subsists between the premises and the conclusion, and whether the conclusion is warranted by the sufficiency of the evidence, the judging of which is the sole function of Logic. Further, these processes are also amenable to rules. We speak of a logical definition as well as a logical argument.

Another writer says that Logic is the Science of

the Laws of Thought. This definition, though it remedies to some extent the defects of the foregoing, embraces some of the psychological operations, such as Memory, Imagination, Conception, &c. We are inclined to refer the word thought more to Psychology than to Logic. Thus the phrase, "Laws of Thought," does not convey any definite meaning. If by thought is meant "*thought as it is*," the province becomes purely that of Psychology, the phrase, 'Laws of Thought,' implying the laws of the rise and succession of our thoughts. Hence the phrase is sometimes qualified by the words "formal or necessary." The word "formal" is equivalent to "having the same form or unaltering." Hence "formal laws" means "laws which do not alter on any account, which are uniform and constant." Such laws correspond to the dies from which medals of various metals are struck all retaining the same form. An argument in any case may be the same, but the matter may be different. Now, it would be useless to talk of the "formal laws of thought," or of "*laws of thought as it ought to be*," without laying down a principle for checking the spontaneous tendencies of the mind, and for discriminating the true from the false.

Jevons lays down in his little hand-book the following definition: "Logic is the science occupied in ascertaining and describing all the general forms of thought which we must employ *so long as we reason validly*." He has not brought out the practical character of Logic, since, in his opinion, it is only *secondary and accidental*. Others have said, "Logic is the

art of directing the reason aright in acquiring the knowledge of things, for the instruction both of ourselves and others."

But the definition of "Port Royal Logic" comes nearer our point; "Logic is the science of the operations of the understanding in the pursuit of truth." This also needs improvement. That Logic is a practical science is brought out in the definition, and its end is also defined to be the ascertainment of truth. But the means is said to consist in an enquiry into the operations of the understanding. This may be a means, but not necessarily the sole means. Again, the word "truth" is ambiguous. Truths are immediate or mediate. Immediate truths are those that are directly known in consciousness and that require no demonstration. My present sensations are stern realities to me, or, are immediate truths. Mediate truths are those that are *inferred*, and whose validity rests solely upon evidence. Now Logic, as Mill says, is not a science of Belief, but it is a science of Evidence. But immediate truths require no proof; they are immediately perceived in consciousness. Therefore, Logic has nothing to do with these. And it has every concern with inferred truths. But the concern that it has, is not to inquire and investigate what truths are mediate and what immediate. That is the business of Metaphysics, to which also belong the inquiries into the nature of Conception, Perception, Memory and Belief; all of which are operations of the understanding in the pursuit of Truth, but with which, however, the logician has no concern. The business



of Logic is to examine the nature of the inferred truths and to value their evidence. For instance, in the syllogism,—All men are mortal; John is a man; therefore, John is mortal.—the first two propositions are called the premises of the syllogism, and they constitute the evidence; and the third is the conclusion; and the province of Logic is to determine the relation between the premises and the conclusion, to estimate the value of this evidence for the drawing of such a conclusion. The definition thus requires modification; and this is effected thus:—

“Logic is the science of the operations of the understanding which are subservient to the estimation of evidence.” This is the definition of J. S. Mill; and he describes those operations by saying that they include “both the process itself of advancing from the known to the unknown, and all other intellectual operations in so far as auxiliary to this.” The latter part of this description includes Naming, Definition, Classification and other processes which relate to the marshalling of facts for the purpose of facilitating Reasoning. He does not also include in the definition any reference to the modes of arriving at suggestions to be verified by the logical tests.

Ueberweg's definition of Logic as ‘the science of the regulative principles of human knowledge’ is also open to objections. Logic has nothing to do with intuitive knowledge. Consistently with his definition, however, he devotes a part of his Logic to Perception, which is a psychological process. A recent writer defines Logic as “the science of the prin-

ciples which regulate valid thought." "Valid thought" is understood to include not only self-consistent thought, but also thought in agreement with objective reality. Thus Deduction and Induction are both recognised as parts of Logic. Invalid thought is not taken account of by Logic unless it be for inquiring into the cause of the invalidity, which is generally the violation of a rule of valid thought. Dr. Keynes, who confines himself to Formal Logic, defines it as "the science which investigates those regulative principles of thought that have universal validity, whatever may be the particular objects about which we are thinking." He does not undertake to decide whether Formal Logic constitutes the whole of Logic, or is only a part of it. But, accepting his definition, he says it is open to us still to recognise the methods of reasoning and research relating to the matter of thought.

Dr. Bain thinks that the modes of arriving at suggestions to be verified by the logical tests also fall within the province of Logic, and hence defines it thus :—

(1) As a Theoretical Abstract Science, embodying the most fundamental principles of all logical affirmation, and inferences deduced therefrom and expressed in suitable formulas. The actual process of theorising consists, for example, in the evolution of syllogistic forms from the fundamental axioms.

(2) As the Practical Science of Proof or Evidence.

(3) As a body of Method auxiliary to the search



for truth. He thinks that Logic in this capacity may give "an account of all known processes that aid the understanding, whether in proving or in evolving truth; provided always that these are of a general kind, adapted to all science or knowledge as such." He mentions as belonging to Method that postulate of Hamilton's which requires us to state explicitly in language whatever is implicitly in thought, the process of 'arranging an argument or chain of reasoning into the form that best discloses to the mind its conclusiveness or inconclusiveness,' and such modes of presenting to the mind known facts and premises of a subject as suggest the conclusions involved.

5. *Utility of Logic.*—We shall now proceed to consider the Utility of Logic. Some false promises held out to the public by the ancients as to the ends which Logic was expected to serve, completely turned the scale of public opinion against the science. People began to think that Logic could serve no end at all, because it did not serve the ends they were made to expect of it. For instance, it (Syllogistic Logic which was the only Logic they knew) was supposed to be the discoverer of truth in all branches of study. This is nothing but exaggeration. Logic in that restricted sense does not discover new truths in any branch of study; but it only judges the evidence for truths, and aids their discovery by arranging and systematising the existing materials. Even at the present day it is not in high favour with men, and it is a pity that it is not so. Even those that may be expected to be better informed, cannot see all that the science can

possibly achieve if only it is properly studied. All men of all departments are always employed in reasoning. Their business is to reason. Now, some would say, common sense is a guide, and a study of Logic is absolutely unnecessary. Mankind argued correctly before Logic was a science. "God did not make man and leave it to Aristotle to make him rational." (Locke). We reply to this by saying that common sense, though it may be a guide, is yet not always a safe guide, and that only a few men in the world think and reason correctly without a knowledge of the principles of Logic. The majority of mankind cannot argue without committing gross blunders, unless the theory of their argument is laid down for them by those that have understood it. Even men of superior common sense sometimes stagger at the complex cases of reasoning which not unfrequently turn up in their daily intercourse with men in society. It is more probable that those that have studied the principles of the science will conform to them in practice than that those that have not studied them will do so. Perfectly healthy men need not study medicine. But, as Jevons asks, how many of such men are there? It is true that we can use our muscles without studying their anatomy. But when the action of any one of them is vitiated by some defect, then the need of a knowledge of its structure becomes apparent. So also, Logic analyses the reasoning process only so far as such an analysis renders any defect in the process apparent. Its work is limited by the necessities of the art.

Logic, then, is a science which deserves cultivation by men of all capacities and turns of mind. In the first place, its speculative value as mere knowledge should not be ignored. As mere knowledge, it also affords a good deal of pleasure. Secondly, it is a criterion of truth; for, it judges by an examination of the relation between the premises and the conclusion whether the conclusion has been justly drawn. Next, it teaches us how to reduce our knowledge to a system. Again, it affords a good exercise to our faculties. Reflective thinking and accurate reasoning are developed by a study of the science. Of the two ends of education, mental discipline and the imparting of information, the former is certainly more valuable than the latter; and the educative value of Logic consists in its contributing to the former end much more largely than many other sciences. A man who has trained his reasoning powers by a study of Logic can study any other science or practise any other art with greater ease than another who possesses merely a fund of information with no power of manipulating it to any advantage. And lastly, we have technical names for the various fallacies by means of which we can easily expose, and otherwise also deal with, the various forms of logical error. Such are the utilities of Logic, and the ends which it indirectly serves are numerous, and can be easily divined by the reflecting student.

---

## CHAPTER II.

*PHENOMENA WITH WHICH LOGIC DEALS—RELATION  
BETWEEN THOUGHT AND LANGUAGE—USE AND  
ABUSE OF LANGUAGE.*

1. Phenomena with which Logic deals.—Logic judges the sufficiency or insufficiency of the evidence that is available for conclusions. The evidence is constituted by propositions. In every proposition, a relation is expressed; and this relation may be viewed either as a relation between two *names*, or as a relation between two *things*, or as a relation between two *thoughts*. Now, the question is, in all its judgments or conclusions, with which of these three does Logic deal? Does it deal with *language*, *thought*, or *objects*? It is contended by some that it deals with language, with names and with relations between names. These have been called the *Nominalists* or Logicians of the *Verbal* or *Nominalist* School. But, to maintain that Language by itself is the object-matter of Logic, is to place it among the philological sciences, and Dr. Whately, when he declared *that* to be what Logic deals with, should not perhaps be taken to have meant anything more than that Reasoning is impossible apart from Language. We believe he thereby intended only to lay stress on the formal aspect of it, and vindicate the claims of language as a necessary element in any product of reasoning or discussion. It is doubtful, as Jevons says, whether any reasoning can take place in the inner consciousness without the use of signs, and,

even if it can, it cannot become the subject of discussion until, by some system of symbols, it can be made known to others. It is the business of the grammarian to discuss the nature and peculiarities of language. But, as an essential instrument for the embodiment and exhibition of thought, it is important to the logician. Another school of logicians, called *Conceptualists*, contend that *thoughts* as entirely separated from the things thought about and as indicated by language, are the phenomena with which Logic deals. To this school belong Hamilton, Mansel, and Thomson. In accordance with this view of theirs regarding the object-matter of Logic, they have defined the scope of the science so as to limit it to a consideration of "the pure or formal laws of thought," or "Laws of thought as thought." Their logic thus is *logic of mere consistent thinking*, or "Formal Logic," and excludes from its sphere what has been called "Material or Inductive Logic" which has reference to the real relations between things. A third school of logicians hold that Logic deals primarily with things, and only secondarily with names and thoughts. These may be called *Phenomenalists*, or, preferably, *Objectivists*. To this school belongs Mill. He takes an *objective* or *material* view of Logic and includes in its scope both Deduction and Induction.

It is incorrect to say that Logic deals with thoughts alone, as separated entirely from things, and apart from language. When there is no object (object for all practical purposes), there is no thought of the object; and when there is no thought of the object,

there is no name. Since things are the objects of thought, and since names and things cannot be connected except through thought, we may say that in a certain sense Logic is concerned with all the three.

It is here necessary to observe that *Nominalism* and *Conceptualism* as names applied to two distinct views in regard to the object-matter of Logic, should not be confounded with *Nominalism* and *Conceptualism* as representing two distinct views in regard to the character of *general* notions or concepts. Of these last we shall speak later on under concepts. It is, however, open both to the Nominalist and to the Conceptualist in regard to the character of general knowledge, to take an objective view of Logic, and to include in its scope both Deduction and Induction.

2. Relation between Thought and Language.—It is necessary to take some account of language because all that thought with which we are concerned in Logic is thought expressed in language. The valid modes of thought are general, and cannot be discussed without a generally accepted language. We shall no doubt have to consider it in some detail under the heads of Names and Propositions. But here we shall consider merely how far it aids the thinking process, and in what form it is necessary for the purposes of effective communication.

The raw materials of thought are obtained in all cases through the senses. The various sensations are aggregated together, and the aggregates come to be recognised as "objects." These objects are named, and are remembered both by names and in sensible



forms by human beings. But the lower animals remember the things about them only in sensible forms. All their observations are recorded in those forms, and their practical ends of finding shelter and prey seem to be adequately served by those forms without the need of a language. Children gain a large stock of sense knowledge before they learn the language needed to express it. The artistic sensibility which is not satisfied with a production cannot adequately express itself in language though it can prompt the touch of improvement. The delicate shades of the physician's diagnosis pass beyond verbal expression.

All this kind of sense knowledge without language may be possible for the individual and may serve his practical needs, but it can never be communicated to others except by direct appeal to experience. When generalities are reached, communication becomes still more difficult without the help of language. When objects are compared and their resemblance noted, this resemblance cannot be communicated to another in the absence of a symbol, except by making him actually compare the objects himself and directing his attention to the common quality or qualities. Every time the communication has to be made, this process has to be resorted to. If, however, the results of generalisation are fixed in language, they can be communicated without difficulty. The value of names thus becomes apparent in general knowledge.

Again, Reasoning does not involve merely one class or generality, but it means the examination, discussion,

and communication, of several classes or generalities brought together in certain relations. Such an examination and discussion cannot be carried on, unless the groups of generalities in all their relations are expressed as propositions. No other kind of language is suited for this purpose than spoken language. Gesture language can at best enable us to compare present objects with the past, but the features of comparison are necessarily limited to the visible and the striking. It is utterly inadequate to express the complex groups of generalities and their relations which so much constitute the thought with which Logic deals. Spoken language is much superior to it in that respect. The advantages of a spoken language over every other kind of symbolism in regard to communication are—(1) that it can be promptly brought into use whenever it is required, (2) that the power of speech is retained even when the other powers (organs) of communication have been impaired by old age, (3) that it is available as well in the dark as in the light, (4) that it is of service at some considerable distance, and (5) that it is susceptible of giving rise to a system of conventional signs sufficient to express fine distinctions and relations. Gesture language prevailed only among primitive men. As intelligence increased and new qualities and finer relations were discovered, demands for expressions also correspondingly increased, and refined and effective modes of expression were hit upon. When men came in possession of improved language, their facilities for thinking also became greater, and



other complex relations and attributes were then discovered. In this way, thought and language acted and reacted upon each other, until the necessities of adequate and clear thinking and communication have put us now in possession of a spoken and written language with its infinite capabilities for embodying the most complex thoughts and refined intellectual achievements.

3. Use and abuse of Language.—The uses of language may be divided into two classes, those that relate to it as an aid to the thinking process, and those that relate to it as a means of expressing and communicating thought. Three uses may be mentioned under the first head and two under the second. These two uses relating to communication are of greater interest to the logician, as Logic is concerned with thought only as expressed in propositions.

(1) *It enables us to form General Notions or Concepts.*—When some individual objects are compared, and they are found to possess certain qualities in common, they may be thrown together into a class by virtue of those common qualities. This class, as characterised by the community of attributes, may be denoted by a word, with the help of which we may think of the class as a whole whenever we want to do so, instead of comparing the particulars once again and abstracting their agreeing features. Tree, mountain, river, white, round, man, plant, &c., are such general names, denoting certain individuals and signifying the attributes common to them all. They aid the fixing in thought of the definite number of attributes

reached by generalisation. Whiteness, roundness, motion, &c., are abstract names referring to the same generalities as their corresponding concrete names, white things, round things, moving things, &c., but drawing attention more particularly to the common attributes than to the individuals possessing them. They denote merely the attributes, but the attributes have no existence apart from the things possessing them. They denote the attributes only as inhering in the individuals. One very great abuse of language consists in supposing that corresponding to every name that exists, there must be a thing actually existing. There is nothing existing in the abstract corresponding to an abstract name. 'Whiteness' merely means 'white things *in so far as they are white*'; 'roundness' means 'round things *in so far as they are round*'; and 'motion' means 'moving things *in so far as they are moving*.' Our attention in each case is limited to the resembling feature. The single name is merely an abbreviated form to express the meaning of the round-about phrase.

(2) *It enables us to analyse complex notions.*—An analysis of the elements composing a complex whole is not easy in the absence of a name for each of the elements. The name of an element enables us to fix our attention on the element, and think of it in exclusion to the rest. In this way, all the attributes of an object, 'a marble statue,' 'an orange,' may be thought of in separation.

(3) *It shortens the process of thinking.*—Thinking implies the passage of the mind from one idea to

another, until all the ideas belonging to a system are perceived in their relations of co-ordination and subordination to one another. In solving a problem, the mind searches after those ideas which belong to a system, and finally perceives their relations to one another and their bearing on the solution. In thinking out the plot of a story, all the ideas are run over in all their relations to one another and in their bearing on the final issue. In all these cases, the ideas are of various degrees of complexity, familiarity, and importance, so that it will be a distinct advantage to the process of thinking itself, if the more familiar and less important ideas are skipped over without the necessity of their being brought up into the full view of consciousness. This advantage is secured by language, and thinking is much shortened. With the help of names which are mere marks of those ideas, the mind rapidly passes through those ideas without waiting to attend fully to each of them. In this way, trains of thought which are extremely complex, are rendered possible. There is a danger, however, which must be guarded against. The ideas, by being always symbolically represented by means of names, are either apt to be ignored altogether, or are apt to become confused. The thinker may ultimately become unable to define them, or analyse their constituent elements.

(4) *It is a means of communication.*—This is the most useful function of language. Social intercourse becomes possible, and each man can profit by the knowledge acquired by others. Ability and knowledge will increase in each individual, and the society

as a whole will progress more rapidly both intellectually and morally. In this connection may be mentioned another kind of abuse to which language is liable. Some words have acquired more than one meaning from causes which will be sketched out in a future chapter, and, in communication, these words are sometimes employed equivocally with a view to deceive those to whom they are addressed. This is a morally wrong practice to which honest thinkers and speakers should never resort.

(5) *It enables us to record our thoughts.*—By means of written language we can record the results of our thoughts for future use and guidance. There may be no immediate use for an item of knowledge, or it may be such as can flit away easily from our minds. In either case, it is best to rivet it in language so that it may be useful either for ourselves or for our posterity. In this way, we are at present benefiting much by the labours of the generations that have gone before, and we are also enabled to hand down to posterity all that we have achieved, and may yet achieve, in our own generation.

---

### CHAPTER III.

#### *PRINCIPAL DIVISIONS OF LOGIC, WITH A BRIEF SKETCH OF THEIR HISTORY.*

I. The commonly recognised divisions of Logic.—Simple Apprehension, Judgment and Reasoning have been usually mentioned as parts of Logical doctrine. *Simple Apprehension* is 'the act of mind by which we merely become aware of

something, or have a notion, idea, or impression of it brought into the mind.' 'The name or term iron instantaneously makes the mind think of a strong and very useful metal, but does not tell us anything about it, or compare it with anything else.' Conception is the process of forming general notions, and involves a rudimentary judgment or comparison of the elements obtained from simple apprehension. Judgment of a more perfect kind is the process of comparing two such notions with a view to see whether they agree or disagree. Affirmation is said to take place when two notions are congruent, and negation, when one contradicts the other. Reasoning is the process by which from certain given judgments we pass to another inferrible from them as the consequence of their mutual relation. From the two judgments, 'All men are mortal,' and 'Socrates is a man,' we infer by the rules of syllogistic reasoning that 'Socrates is mortal.' To these three parts of Logical doctrine, a fourth has also been added, namely, *Method*, which considers "how reasonings, when employed continuously upon any matter whatever, should be set forth to produce their combined effect on the mind." It bears the same relation to Reasoning that Reasoning bears to judgment. It is the putting together of reasonings in a discourse in the manner best suited to disclose truth, just as Reasoning is the putting together of judgments so as to draw a conclusion from them.

Regarding the nomenclature employed in the above paragraph, it must be remarked that 'concepts' and 'judgments' are words that have been usually adopt-

ed by the Conceptualists, while 'Terms' and 'Propositions' have been usually adopted by the Nominalists. But, as Mr. Welton says, there seems to be no good reason for adhering strictly either to the one form or to the other. We shall most frequently use 'Terms' and 'Propositions' as the reference will, in most cases, be to the verbal expression of thought; but we reserve to ourselves the right of using concepts and judgments, whenever the reference is more particularly to thought. Dr. Bain objects to the use of the word 'Judgment' as the equivalent of 'Proposition' on different grounds. A proposition is stated to be 'a judgment expressed in words;' and Judgment is defined as the mental operation whereby we pronounce two things to agree or to disagree. But Dr. Bain remarks that the mental operation whereby we arrive at propositions is much more extensive, including the processes of Observation, Classification, Induction, and Deduction, than is meant by the word 'Judgment.' Judgment, he thinks, refers more particularly to the discerning of the agreement or disagreement of a proposition to a given case, as in the interpretation of law: that is to say, to the deductive process. But if by 'judgment' is understood the mental *product*, apart from how it is arrived at, which represents the linking of two distinct facts or things, then it is the mental correlate of a proposition, and must be susceptible of being used whenever the reference is specially to that mental correlate.

2. Dr. Bain's enumeration.—Dr. Bain himself, as a materialistic logician, mentions four distinct



operations as being essential for the *discovery* and *verification* of knowledge. They are, (1) *Observation*, including *Experiment*; (2) *Definition*; (3) *Induction*; (4) *Deduction*.

(1) *Observation*.—This is either external or internal, and is necessary for arriving in the first instance at suggestions to be submitted to the tests of Logic. Its rules, however, are not common to all the subjects, but special to each. If they were common to all the subjects, then Observation would be a part of Inductive Logic. It should not, however, be entirely excluded from Logic, as it is not wholly a matter of pure intuition, the simplest observation being a mixture of intuition and inference. When we observe a needle pointing to the north, we know that we are looking at a needle and that its direction is north, only from past experience. One fallacy of observation consists in confounding the two. Experiment serves the same function as Observation, but that process is active, while Observation is passive. They both relate to facts, while the remaining divisions of Logic relate to the generalising of facts. There are various errors incident to observation. Errors may arise from deficient light, from defective sense-organ, and from the observer's own prejudices or inclinations. It is difficult to find persons who can register facts with fairness for, and against, their own fond views. An unbeliever was shown a temple with the paintings of all the persons who had been saved from shipwreck, after paying their vows. When asked whether he did not now acknowledge the

power of the gods, "Ay," he answered; "but where are *they* painted that were drowned after their vows?" Again, a man may not know *what to observe*, i.e., the facts relevant to a subject. A certain amount of intelligence in the observer is needed for this purpose. All the errors due to external and internal conditions, and all those arising from insufficient and irrelevant observation, may be avoided if only the observer proceeds with caution, repeats the observations, compares them with one another, strikes the averages, and eliminates all the distorting causes. A rigorous training in observation is a necessary preliminary to scientific investigation.

(2) *Definition*.—This is the generalising process aiming at the determination of clear concepts, or at fixing definitely the meaning or connotation of general names. This is the simplest of the generalising processes, and embraces three operations—Comparison, Abstraction and Generalisation. We first assemble the things to which the name in question is applied, *compare* them with one another with a view to see in what respects they agree and in what they differ, next *abstract* from these things the particular or particulars in which they all agree, i.e., think of them solely keeping the differential marks in the background, and thirdly, take a mental grasp of those things in so far as they agree in those particulars, and give them a general name. This generalising process may refer to one property, or to many properties. In other words, the things assembled and compared may be found to agree in one property, or in more than one property.

This settlement of the actual connotation of a name by means of the actual denotation was done in early times by means of a dialectical procedure, which was more effective than solitary thinking both on account of its stimulating character, and on account of the fact that two or more minds are better than one, and can not only bring to light more applications of the name than any one of them singly can, but also arrive at more satisfactory conclusions with regard to what attributes are to be regarded as constituting the connotation of the name. Socrates (B.C. 469—399) was the first to practise this procedure on a memorable scale. Having declared physical inquiry to be both irreligious and impossible, he set about formulating a science of moral conceptions; and, with this end in view, he attempted to get at a definition of ethical notions by the generalisation of particulars. Knowledge was also of value to him independently of morality; but it had no other object than conduct, and was efficient even as a motive. Taking the name 'injustice,' for example, he would ask his interlocutor if he would apply it to the act of a man who deceived another. On receiving the reply 'Yes,' he would ask him if he would apply it when the persons deceived were enemies instead of friends. If the reply was 'No,' he would again ask if the act of cajoling a child into taking medicine would be called an unjust act, and so on. In this way, by bringing out a number of cases, he would enable his interlocutor to arrive at the right definition. It was not that he deliberately set about teaching the right

definitions of words to people by his method of *Analytical Interrogation*, but that he was in quest of accurate definitions himself. The whole situation, however, assumed that unfortunate appearance, because he was a thorough master of particulars, and had the knack of readily meeting the answers of the interlocutor with searching queries and unforeseen objections. The aim of Socrates in all this, was merely to discover the meaning of a name as generally understood by the people. But Definition also includes a certain readjustment of boundaries by dropping off some individuals and including others.

Definition as a generalising process with a view to the settlement of the connotation of a general name, should not be confounded with Definition as the mere expounding of the connotation of a name already settled.

(3) *Induction*.—All reasoning depends upon Agreement. Reasoning may be from particulars to particulars, or from particulars to generals, or from generals to particulars. In the first case, we say upon the ground of similarity that a certain statement is true of one thing when it is true of some other thing or things; we say that boiling water will scald the hand when it has been found to do so in many past instances, the evidence for the inference consisting in the actual facts observed. The second case of Reasoning, called Induction, is also founded upon Similarity or Agreement. Instead of applying our past experience to a single case, we declare its applicability to all cases of a *similar* character. We give a *formal* expression to the evidence that we have gathered from past experi-

ence. We say that, under certain specific conditions, a certain statement will hold true. 'All men are mortal' is an inference which we draw from detached observations. John died, James died, Robert died, and therefore all those that resemble John, James, Robert, &c., *in certain peculiar and assignable characteristics*, will also die. This is proper inductive inference. This is essentially the same as the first, because that evidence of resemblance which justifies the inference in a single case ought to justify it also in all cases of the *same kind*. An induction is characterised, as Dr. Bain says, by three features. It must be a *real* proposition, as opposed to a Notion or Definition. In other words, it must be a proposition expressing a conjunction between two distinct things or notions, a conjunction that may be disputed. In a notion, however, the conjunction of attributes is a matter of tacit assumption. Secondly, an induction must be *general*, i.e., applicable to all cases of a given kind. From cases observed, the inference should be to cases not observed. Thirdly, the method must be an appeal to observation or fact; that is to say, it must be an inference from particulars observed, from experience, from the interpretation of nature, and not a deduction from another proposition, or from any preconceived principle.

The necessity of this Inductive Logic, of this appeal to nature for truths, was felt when the Authority of the Church became aggressive and claimed to pronounce on all matters, even on those that lay outside Theology. Truths not in harmony with their general

convictions were forced upon people, and it was almost universally felt that a method must be sought to ascertain material truths, or truths of cause and effect, independently of the dictates of the Church. This was attempted by Francis Bacon (1561—1626), Lord Verulam, who is generally regarded as the founder of Inductive Logic, and who, with all the weight of his position and influence, preached the necessity of interrogating nature, if her ways are to be got at, and her laws ascertained. Minto tells us that the credit of founding Induction is due to Roger Bacon, the Franciscan Friar (1214—1292), who distinguished between the two modes of knowing, Argument and Experience, and laid much stress on the latter as the only great source of knowledge which makes us feel certain about what we know. But, as Minto himself informs us, though their principles were the same, though they both declared that our own preconceptions should not be imposed upon nature, and that Nature should be carefully scrutinised so as to make her yield truths, yet Francis Bacon developed elaborate methods for this interrogation of Nature, while Roger Bacon stopped with mere suggestions and exhortations. His methods, however, were very imperfect, and it was left for John Stuart Mill (1806—1873) to complete that grandest edifice of scientific method, and he was prompted in that undertaking by the vagueness which existed in regard to truths in Politics, Ethics, History, and Psychology. There was no method which could be relied on for proving truths in these sciences, and he resorted to the workers in the



more exact sciences, with a view to learn their tests of truth for application to the phenomena of the vaguer studies. His attention was directed more to their tests of truths than to their modes of discovering them. He was indebted to Herschel and Whewell (more particularly to the former) for the raw materials of his inductive method; and he connected this method with the body of the Old Logic, making the latter in a manner subordinate to the former. This was done about the year 1840.

(4) *Deduction*.—This is reasoning from generals to particulars, and is also based on Similarity. It is applying a general law to any particular case. It consists in developing the consequences of a general law. We apply the general principle derived from observation to particular cases as they arise, and when these are found to fall under it, the general principle acquires new force and significance. Having known from the generalisation of particulars that all men are mortal, and having known also of some particular being that he is a man, that he possesses the characteristics peculiar to men, we infer that that particular being is mortal. All men are mortal. David is a man. Therefore David is mortal. This is what we call Deductive or Syllogistic reasoning. This is the simplest form that we can conceive of. Here, the first proposition is called the major premise; the 2nd, minor premise; and the 3rd, conclusion. The first two are called the data, and the 3rd is the conclusion. The universality of the major premise becomes strengthened, when the conclusion is

verified to be true. There are various other forms which Syllogistic Reasoning assumes, which are more complex, and which present some difficulty to beginners.

Aristotle was the founder of Deductive Logic. He formulated his system of logical principles with a view to provide his pupils with guidance in the art of disputation which was the favourite pastime of the Athenians of the period, particularly, of the more intellectually disposed among them. This disputation, so amply illustrated in the Dialogues of Plato, consisted in two people taking up opposite positions, and one of them attempting by a series of questions admitting of the answer "Yes" or "No" to exact from his opponent admissions which were inconsistent with his original position. Aristotle's system of Logic was intended to help the questioner in putting together and interpreting the admissions obtained from his opponent, or showing him that they necessarily involved what he was himself contending for. It could also help him in suggesting the admissions that have to be obtained from the opponent. This necessity for the questioner and the respondent in the art of Socratic disputation to know the implications in the admissions made, which prompted Aristotle to frame his Syllogistic Logic, makes clear the primary uses of this Logic, and also its limitations. It was primarily intended as an organon for securing consistency of thought, for a clear apprehension of all that is involved in a single statement or in a number of statements, no regard being paid to the material

truth of the statement or statements. What is drawn as an inference in Syllogistic Logic is even now considered to be just what is contained in the premises and nothing more. The truth of the premises being taken for granted, the conclusion follows as a matter of necessity. This is the formal character of the Logic as opposed to the material. We may accept as true premises, "All inductive sciences are abstract sciences," and "Mathematics is an inductive science," and draw from them the conclusion, "Mathematics is an abstract science." The reasoning is correct, and is in accordance with the rules framed by Aristotle, and we have got also a conclusion true in itself; but the premises are false. If we adopt mere symbols, then we keep out of consideration the material truth or falsity of the propositions, and pay heed only to the form of reasoning; e.g., All M is P, all S is M, and, therefore, all S is P. To formulate rules for determining what are the implications in a given proposition or propositions, irrespective of the material truth or falsity of such propositions, was no doubt the primary aim of the Aristotelian Logic as suggested by the circumstances of its origin; but it should not be forgotten that the more serious thinkers of the period had *truth* as their main aim in entering on such debates, and though they had no criterion of truth except the common sense of mankind in general, yet they sought to clear their minds of all prejudices and fill them with what were generally accepted as truths. Bearing this fact in mind, we have now to consider in what manner such debates could lend themselves to

the clearance of errors and the discovery of material truths. Having had to decide between two opposing theses as to which of them was true and which false, they entered on a debate with a view to know whether any flagrantly absurd consequences followed from either of them, or from its equivalent, when combined with other well-known truths; or whether from some generally accepted truths a last result could not be obtained, which was the direct contradictory of one of the theses. That which in the course of the disputation yielded absurdities was abandoned, and the other was accepted. Disputation was thus in the aim of the more serious thinkers a subordinate process, aiding in the establishment of material truths. The rules formulated by Aristotle for conducting the disputations successfully were thus essentially (though he never intended them to be such) rules for carrying a thesis into all its consequences to know whether it was true or false. They were, in fact, rules of interpretation. This was just the view taken by Mill in the last century. If this was not the original aim of the founder, it was because there was no systematised process of arriving at material truths, to which his own process of syllogising could be subordinated. Induction had not been developed in his time, and *his* conception of the process was imperfect, and its application was often impracticable. There was no need for what could be reached by *his* inductive process to be verified by any deductive extension. The need existed only in the case of less certain truths. If induction, as conceived

by Mill, had been developed before him, we do not know how he would have connected that process with his own. Perhaps he would have connected them in the same way in which Mill connected them in the last century. This discussion, however, is premature. We have stated the circumstances under which the logic of Aristotle arose. In framing the logic itself, he must have generalised the principles or rules from all those forms of reasoning which, starting from admittedly true premises, led to conclusions generally accepted by mankind, as distinguished from those other forms which yielded incorrect conclusions, *i.e.*, conclusions not accepted by the generality of men. But these rules could only give a certain class of truths, *viz.*, truths of consistency, or offer protection against a certain class of errors, errors of inconsistency.

Omitting Observation which does not form a part of Logic since its rules are not common to all the sciences, we have three divisions, *viz.*, Definition, Induction and Deduction. This is the logical order of naming them, since Definition supplies the materials for Induction, and Induction supplies the major premise for Deduction. This is the order, therefore, in which the parts ought to be taught in schools, and expounded in a treatise. But the inverted order is usually adopted, since Aristotle, who first developed the logic of Deduction, overlooked, though not wholly, the remaining parts, *viz.*, Induction and Definition; and when these were reintroduced into the course of studies, Dr. Bain tells us, they were made to follow Deduction and not

to precede it. Another reason for taking up Deduction first is the possibility of explaining it without reference to any of the others. But the order in which they were historically developed is, as we have seen, different. Definition was the first to be put into a scientific form, and this was done by Socrates. Deduction was the next to be developed, and Induction was the last.

Now, Deduction is the portion of Logic which we mean to treat of in this small book. But before its exposition can be taken up, some preliminary subjects require to be discussed.

---





## BOOK II.

### NAMES AND CONCEPTS.

---

#### CHAPTER I.

##### *NAMES AND THEIR IMPORT.*

1. On the necessity of an Examination of Names.—It is usual for writers on Logic to begin their treatises with an examination of names and propositions before they take up Syllogism. Such an analytical consideration of language is necessary for the following reasons :—

(a) Language is the chief vehicle of thought. Logic is the Art of a portion of thinking. Deduction proper, or Syllogistic Reasoning, must be conducted as we have pointed out, solely through the instrumentality of propositions which are simply statements of what we believe or disbelieve ; so that, the least imperfection in the knowledge of the means by which we express ourselves is sure to land us in misconception and error. Again, these propositions are composed of terms. We cannot study the character of propositions without studying terms and their varieties. What we call a *sentence* in grammar, we call a *proposition* in logic. In every proposition, there are two terms, the subject and the predicate, as the boy runs. The subject is 'the boy,' and the predicate is

'runs.' The strictly logical form of this proposition is, 'the boy is running.' Here, besides the two terms, there is a third element, *is*. This is called the copula. In a negative proposition the copula is, *is not*, when the subject is singular. The copula denotes whether the predicate is affirmed or denied of the subject. It is not properly a term. Thus, the chief constituents of a proposition are terms, and a study of these is therefore necessary.

(b) Terms are sometimes ambiguous, *i.e.*, are capable of more than one meaning. Thus the words, subject, foot, church, &c., have more meanings than one. Any treatise on Logic must give warning to its readers of the dangers that lurk in the use of such ambiguous terms. A full analysis of terms and their varieties will enable us to avoid confusion and difficulty, and to conduct our reasoning right through, with accuracy. We may then rely upon the correctness of our conclusions.

(c) Names are the clue to the universe of existing things. In laying down a Code of Evidence and of Methods for all kinds of knowledge, it is necessary to generalize and reduce to heads the whole universe of ascertained things; and these are indicated by names. By means of names, we can bring to light all the subtle distinctions and relations between things recognised by mankind.

2. Terms and Names—how distinguished and defined.—Now we have used *terms* and *names* indifferently. What are terms as distinguished from names? Terms are the extremes of a proposition (Latin *termi-*

nus, a boundary). They denote the things or classes of things, qualities or groups of qualities, that are affirmed to agree or disagree in a proposition. While names are used absolutely and are marks attached to things or attributes to enable them to be spoken about, terms are *names regarded as subjects or predicates of propositions*. In the proposition, 'Gold is valuable,' there are two terms, the subject, 'Gold,' and the predicate, 'valuable'; and the proposition affirms a relation of coincidence between what are denoted by 'gold' and 'valuable.' The terms are the verbal expressions of the things or the classes of things, qualities or groups of qualities, that are brought together into some kind of relation in a proposition. A name is a name even when it does not form part of a proposition; but a term is a term, strictly speaking, only so long as it stands in a proposition. But as every name is capable of being used as a term in a proposition, we do not commonly observe any difference between the two words.

It must also be noted that a term or a name may consist of many words instead of one. In the example, 'intelligent boys are prone to do mischief,' 'intelligent boys' is one term, and 'prone to do mischief' is another term. It will be seen that in every language separate names can be found only for the most important objects or qualities, and the simplest experiences; but the vast majority of things in different situations and combinations, persons in different capacities and modes of life, and the complex experiences in the order of events, are designated only

by what have been called many-worded names, *i.e.*, names formed by putting together many words. The name, "the present Viceroy of India," denotes a certain individual in a certain capacity at a certain time and in a certain place. Some of these words are names in themselves.

Again, a term or a name is "a mark attached to a thing to enable it to be spoken about." This definition suggests to us the fact that names are intended mainly for the purposes of communication. This is perhaps justifiable on the ground, that the function of communication which belongs to names is more relevant in Logic than that of aiding solitary thinking. It also brings out the fact that the name is the name of a *thing*. Hobbes defines it thus:—"A name is a word taken at pleasure to serve for a mark which may raise in our mind a thought like to some thought we had before, and which, being pronounced to others, may be to them a sign of what thought the speaker had, or had not, before in his mind." This definition implies that names have been arbitrarily chosen to denote things; but this will not be accepted by many, as language is believed to be a gradual growth, not an artificial product. Secondly, it does not include the fact that a name may be many-worded. Thirdly, it inclines to the view that names are names of our ideas of things, and not of things themselves. This last criticism leads us to the consideration of the import of names.

3. Import of Names.—Respecting names, there is a controversy of a psychological character, whether

names are names of things, or of our ideas of things. Is the word "sun" the name of the object itself or of the idea which it raises in our mind? Mr. Mill holds the former opinion, and popular usage is in his favour. The latter view had a large number of supporters till recently. One reason in favour of this view is, that the notion (*e.g.*, tree) is comparatively fixed and finite, and can be easily retained in the mind and communicated to others, while the corresponding object possesses attributes which are infinite in number, most of which are fluctuating, and only a few of which are present to the mind at any given time. This view was held by the old logicians, and is in perfect accord with their narrow treatment of Logic. They were professional disputants dealing with a stock-in-trade of notions, once for all settled, comparing and analysing them, more than verifying and correcting them by a reference to material objects. To such a class of verbal quibblers or eristic disputants, such a reference was unnecessary and irrelevant. They were like bankers who regard their paper appliances of credit as referring to the coin they represent, and not as having any reference to the materials of wealth themselves. Now, *we* study nature at first hand, and while we also think that our notions must be fixed and finite, we insist that these notions obtained by a generalisation of objects cannot be regarded as independent of the objects, and that, *for securing community of signification of names which is absolutely essential for accurate rational intercourse*, an ultimate standard of reference is needed, *viz.*, objects, which will



help us by giving us warning of the changes in the conventional uses of terms, and enable us to define and readjust their meanings accordingly. It is not good that the terms should be absolutely unchangeable in their meaning, for then they would fail of their intended purpose. Language must keep pace with the periodical discoveries of new objects, attributes, and relations. Names, therefore, must primarily refer only to objects.

Another reason that is usually advanced for referring the name to the notion is, that we thereby avoid the necessity of entering into any dispute regarding the nature of the 'external object,' and even if we succeed in making out our position as against the Idealist, we are bound to show what objective reference there is in the case of such words as centaur and chimera. Now, the external object that the logician need take account of is not any ontological entity, but the external object as testified to by the senses; and all the comparison that it is necessary for him to make to find out the true or the false, is comparison not between an idea and a metaphysical entity, but between an idea and an actual presentation, between a recollection or representation and the actual impression. Again, in the case of centaur, for example, though there is no animal corresponding to it in the world, yet, whenever we speak of it, we refer to the common notion entertained by others, and this is the objective reference. We can test the correctness or incorrectness of our notion by appealing to a standard outside of ourselves, *i.e.*, the notion as entertained by others. Also, the elements themselves

belong to the object world, though their union belongs to the imagination.

In support of his view, Mill says: "Names are not intended only to make the hearer conceive what we conceive, but also to inform him what we believe. Now, when I use a name for the purposes of expressing a belief, it is a belief concerning the thing itself, not concerning my idea of it. When I say, 'the sun is the cause of day,' I do not mean that my idea of the sun causes or excites in me the idea of day: or, in other words, that thinking of the sun makes me think of day. I mean that a certain physical fact, which is called the sun's presence (.....) causes another physical fact, which is called day. It seems proper to consider a word as the *name* of that which we intend to be understood by it when we use it."

Mill speaks here of 'things,' as if they are external to ourselves causing our sensations. He distinctly implies it in his arrangement of the categories which he divides into our simple sensations and the external objects which produce them. But he also expresses it as his own opinion that, in the ultimate analysis, all external objects are nothing else but states of consciousness. This is often mentioned as an inconsistency in Mill. But it must be remembered that "Logic is not an ultimate science, but moves, so to say, upon a plane at the same depth of philosophic analysis as do the various physical sciences." 'Things' may be mere states of consciousness in their ultimate analysis, but by some mental process we have come to contemplate them as external to ourselves

and reason about them. This recognition of externality which we have by some process or other gained, is unavoidable in social intercourse, and the objection, therefore, is irrelevant in Logic as it is in the various physical sciences.

---

## CHAPTER II.

### CLASSIFICATION OF NAMES AND DETAILED

#### EXAMINATION OF EACH CLASS.

1. General remarks on Terms and Non-terms.—We shall now proceed to consider the various divisions of names. Such divisions are neither philological into Italian names, Arabic names, French names, English names, &c., nor rhetorical into plain and figurative names, nor grammatical into the various parts of speech, but *logical* according to the reference of names as elements of logical propositions.

*Categorematic and Syncategorematic words.*—We all know that there are some words which can stand as *terms* by themselves, *i.e.*, either as subjects or as predicates of propositions, and some others which cannot do so. The former are called *Categorematic words*, and the latter, *Syncategorematic* (Gr., with a predicate). Any word must be either the one or the other, and Logic is concerned only with the former. All articles, adverbs, prepositions, conjunctions, and interjections cannot be used alone as terms. We cannot say, "*The* is good," "*How* cannot read," "*To* cannot write," and so on. But, in the instances, "*The* is an

article," "To is a preposition," &c., we refer not to the meanings of those words, but to the words themselves as words. Except in the case just mentioned, the above parts of speech cannot serve as subjects. They may, however, be joined to other words capable of being used alone as terms (categorematic) and recognised as same; and a combination of this kind, the schoolmen called a *mixed term*. Nouns or pronouns can form terms in the nominative case, but not in the objective: in the possessive case they can stand as predicates, but not as subjects: we can say 'this book is John's, (or his),' but not, 'John's, (or his) is here.' Adjectives and participles can be used as predicates but not as subjects, as 'Socrates is wise,' 'John is running.' The adjective can also be the subject, as in 'Green gives relief to an exhausted eye.' But here, the adjective green is elliptical for green colour. Even when it is the predicate, some contend that it is only elliptical for a noun, and that it is therefore to be reckoned as syncategorematic. With them, 'orange is round,' is elliptical for 'orange is a round object.' But there is really no difference of meaning between *round* and a *round object*, and it is only custom that has sanctioned the use of the one, and prohibited the use of the other, as subject. Adjectives, therefore, may be classed as categorematic. Logic does not recognise any other verb than *is*, or *are*, or any other variation of *be*, which is the copula in all propositions expressed in true logical form; and a verb is represented by the copula and the participle of the verb together. We cannot talk of syncategorematic terms,

because they cannot be the extremes of a proposition.

There are three classifications of terms which are of special logical significance, namely, General and Singular, Connotative and Non-connotative, and Positive and Negative. There are others also which are of some importance, *viz.*, Abstract and Concrete, Absolute and Relative, and Univocal and Equivocal. We shall now treat of them severally, but we shall observe a different order for the sake of convenience.

2. **General and Singular.**—This is the first grand division of names. A general name is a name that can be truly applied to each of an *indefinite* number of objects, possessing in common an aggregate of properties. 'Tree' is a general name. 'Man' is another. The word *tree* brings home to our mind objects that possess a certain number of properties in common. It can be applied to any object of the creation possessing these attributes. It does not single out, or refer to, this tree or that tree, but specifies a whole class. Hence it is called a *common* name and also a *class* name. But a *class* name is either a *class name definite* or a *class name indefinite*. The *class name definite* is the name of a class which is composed of a limited number of individuals; as, the peers of the Realm, the Oceans of the globe. The *class name indefinite* is the name of a class which is unenumerated, which contains individuals known and many more unknown, the sole means of testing whether an individual belongs to the class or not being the class attributes. A general name is identical with a class name indefinite. It is a significant name inas-

much as it signifies or implies a number of attributes the possession of which alone entitles an object to be called by that name ; so that a new object discovered to possess these attributes is thrown into that category and is subsequently regarded as such. These general names have their own uses, and save us a good deal of trouble. Without them, we shall have to invent a name for each object of the creation. For instance, trees are found in various places, and one can't be particularizing each tree by means of a separate name. Again, in our daily conversation, every time we find it necessary to refer to a class, we shall have to be enumerating all those individual objects that enter into it. Supposing we want to assert a general proposition about all men, are we to be singling out individual by individual and repeating the names of John, James, Robert, Williams, &c. ? Such an enumeration would be awkward and would involve a good deal of time and difficulty. To save these is the chief function of general names.

The term *Viceroy of India* is general, since at different times it may be applied to different individuals. But by prefixing '*the*' to it, we may render it singular, since the term will then refer to the particular viceroy of the time to which we are referring. Dr. Keynes points out that "a name is to be regarded as general if it may be *potentially* affirmed of more than one, although it accidentally happens that as a matter of fact it can be actually affirmed of only one, e.g., *King of England and Spain*." We should also regard such names as are not applicable to any individual at



all as *general*, e.g., *President of the British Republic*. A really singular name is that which is not even potentially applicable to more than one individual. The name representing even an absolutely imaginary class of things, as *centaur*, should also be regarded as *general*. When a certain type of character that may possibly belong to a whole class is indicated by a proper name, as when we say 'he is a Solomon,' the name is *general*.

Again, we have to assert particular propositions. We cannot do so without particular names. And these indicate, or point to, particular individuals or things, as John, this tree, that stone. All *Proper* names are singular names, as Milton, Shakespeare, &c. Any proper name, though it may be the name of several individuals, is yet not general, since it is not applied to them in virtue of their being similar. The name cannot be truly affirmed of them all in the same sense. It is an *unmeaning* mark to indicate a person, or thing, and the person uttering the name thinks of only one individual, at least in his own mind.

Again, a number of words connected together may indicate a single individual, as 'the present Emperor of Germany,' 'the wicked Pope,' 'the boy king of the North,' &c. These point only to particular individuals. They are called *Significant Singular names*. They are general names limited in their application to single individuals by means of restrictive epithets or expressions. They are used when the particular things which we have need to indicate in common speech have not got their own

names, *e.g.*, 'This pen' is bad, 'that ground' is wet. Sometimes, even though the thing to be mentioned has its own proper name, we refer to it by this limited general name if it happens to be a very familiar object to which we have occasion constantly to refer, as 'the river' is full; or if we wish to emphasize any special feature, as 'the Victor at Waterloo.' In other cases, again, the proper name may be unknown, and then a many-worded name is the only means of definitely indicating the individual: *e.g.*, 'the writer of the letters of Junius.' The words 'first,' 'second,' &c., can be used to isolate individuals, as also words indicative of geometrical position or magnitude: 'The first Governor of Madras,' 'The Northernmost point of Europe,' 'The tallest in the class.'

Thirdly, *all Collective names* are singular. They are singular inasmuch as they indicate entire collections of *similar* objects. The word *army* is a collective name. It is general when it is viewed as referring to many armies, the French army, the English army, the Austrian army, &c.; it is singular only because, taken absolutely, it denotes *one* entire collection of a number of *similar* individuals. 'The Austrian army' would be more strictly singular, and so are 'the 8th infantry,' 'the 14th regiment,' 'the Spanish fleet,' 'the British Museum,' &c. These are names narrowed down to denote single collections, by means of significant epithets. And thus we may say that the same name may be regarded as collective when viewed with reference to the individuals composing the whole, and general

when viewed with reference to the several collections of the same kind. When it is viewed as collective, it is singular and not general. The words, *library*, *navy*, *fleet*, *armour*, *regiment*, *infantry*, *cavalry*, and *year*, are some of the words that may be viewed in these two aspects. The word, *library*, is a collective name inasmuch as it is applied to a collection of books. It is a general name so long as it can be applied to the Civil Engineering College Library, the Christian College Library, the Oriental Library, &c. We cannot call 'The Spanish fleet' absolutely a singular term. We can call it, if we like, collective singular. The word "Universe" is peculiarly a collective singular name.

We have been taking account of collective names that have a meaning. The question, however, may be asked, are there collections of similar things, denoted by purely arbitrary, or meaningless, names? Such names are not common, but Dr. Venn suggests the few names of geographical groups, such as the Pyrenees, the Orkneys, &c., as illustrating the class. Each of these names denotes a group of natural objects, and is a proper name because it gives us no information whatever about the group. But Dr. Venn points out that in all these cases the proper name was probably given to the group first appreciated as a whole rather than in its parts, the character of these as a unity being prior to, and more prominent than, their character as a collection. There is nothing impossible in imposing a true proper name on any collection of objects or persons as a collection, but this would serve no purpose.

in Logic, and would lead to an unnecessary and inconvenient multiplication of names.

The distinction between general and collective names is very important and often gives rise to much confusion. A general name, for instance, *man*, can be applied severally to John, William, Henry, Andrew and to all those possessing the requisite attributes. But a collective name, for example, 'The Presidency College Library,' cannot be so applied. It does not refer severally to 'Spencer's Data of Ethics,' to 'Spencer's Principles of Psychology,' to 'Stubbs' Constitutional History of England,' or to 'Milton's Poetical Works,' but refers to all these taken together. We cannot say 'Spencer's Data of Ethics is a library,' &c. Thus, a general name is used *distributively*, whereas a collective name is used *collectively*. But it must be noted that a general name may be used in a collective sense by the prefixing of 'all' in the sense of 'all together,' or even without the prefix: *e.g.*, 'All the houses in the village are A's property,' 'My books would fill three large book cases,' 'The stars give sufficient light for the travellers in the night.' Again, distributive use may be noted in the following examples: 'The army was scattered,' 'All the men were imprisoned,' 'The fleet separated.' Thus, the antithesis is more properly between the collective and distributive use of terms than between collective and general terms.

All *Material* (or *Substantial*) names are collective singular: as gold, silver, water, oil, &c. Gold suggests to us the entire collection of that metal. Others

think, however, that the name applies to all the existent pieces of gold distributively, *i.e.*, that the name gold is applicable to each of the pieces and that it should hence be viewed as general. Dr. Venn holds that such names are of ambiguous import, admitting of the collective sense when used as subjects of propositions, and admitting of the distributive sense when used as predicates. When I say 'gold is heavy,' I am thinking of all gold, or of a piece as representative of all the rest. When I say 'this is gold,' I use it as a general adjective (which is a distributive use), just as when I say 'milk is white.' He says that this peculiarity which such names exhibit is due to their special characteristics of divisibility and homogeneity. "The fact that we can divide and reunite as we please, and can take any one piece of gold as a fair specimen of any other piece, confers at the same time an obvious unity upon the whole assemblage of pieces, such as can hardly be found elsewhere, whilst it offers great difficulties in the way of our regarding any single casual piece as in any strict sense a unity." Here, as elsewhere, however, he shows a distinct partiality for regarding them as *peculiarly collective*. Perfect homogeneity of the pieces, the possibility of their amalgamation, and the circumstance that the pieces, being infinitely divisible, are not strictly defined units, prevent us from regarding them as general names. The first two of these three reasons, on the contrary, constitute the special ground for regarding them as *peculiarly collective* (as distinguished from ordinary collective names), while the third does

not constitute a reason for not regarding them as such.

3. Concrete and Abstract.—A *Concrete name* is the name of a thing. This tree, this table, clock, book, paper, and snow are all concrete names. The first two are names of particular things, while the rest are names of any one of many things. The word 'thing' in the definition is used in a wide sense so as to include everything of which an attribute or attributes can be predicated, or which can be a *subject of attributes*. An *Abstract name* is the name of an attribute, or a group of attributes of a thing; as the height (of the tree), the breadth (of the table), the shape (of the clock), the composition (of the book), the thickness (of the paper), and the whiteness (of the snow). Each of these is one of the attributes of the object referred to. And this attribute, it must be remembered, has no separate existence whatever, but is thought of, as belonging to that object. It is thought of, moreover, to the exclusion of other attributes. It is abstracted or drawn away from (L. *abs* = from, and *trahere* = to draw) its other attributes. The breadth of the table, for instance, is conceived by the mind to the exclusion of its other attributes, such as, length, height, solidity, shape, &c.

In those cases in which a name is the name of a class of objects owing to their resemblance in certain common quality or qualities, this distinction between concrete and abstract is easy of application. The name of those objects is the concrete name, and the name designating the common quality or



qualities, *considered apart from those objects*, is the abstract name. *Man* is the name of any one of a number of individuals, and is a concrete name; while *humanity*, denoting the aggregate of attributes possessed by all men, is the corresponding abstract name. *Triangle* is the name of all those figures which are bounded by three straight lines, and is a concrete name; while *triangularity*, the name of the common feature of all triangles, is the corresponding abstract name. When two names are given which are thus related, there is no difficulty in determining which is concrete and which is abstract in relation to the other. Many of these concrete general names have their corresponding abstract names: poor, poverty; hill, hilliness; miser, miserliness; &c. And in the case of those that have not got abstract terms corresponding to them, such as, table, glass, &c., it is possible to frame them; in fact the tendency among mankind is actually to invent abstract terms where there are none in order to avoid circumlocutory expression.\* The

---

\* It is pointed out by Dr. Bain that the abstract name is not absolutely necessary for ordinary speech, nor even for science. The meaning it conveys may be expressed by circumlocution by means of general names. The name 'motion' limits our attention to the essential attribute of 'moving things,' so that it may be regarded as equivalent to the phrase, 'moving things *in so far as moving*.' Similarly, justice is equivalent to 'just actions *in so far as they are just*.' Any essential attribute is not entirely divorced from the objects possessing it, so that the name denoting it denotes it not as existing apart from the objects, but as existing *in* the objects. Thus in expressing a fact of agreement, there is

importance of the distinction between concrete and abstract, from a logical point of view, lies in such pairs of terms, and hence the older logicians confined it to them. But, to make the division exhaustive it is better to bring under Concrete not only General terms, but also Significant Singular Names and Proper Names,† though these have not got Abstract names corresponding to them.

In certain cases, however, this distinction is difficult of application. When names are considered absolutely

greater propriety in referring to the agreeing things and qualifying them so as to limit our consideration to the agreeing feature to the exclusion of the differing features, than in simply referring to the agreeing feature itself. It is only by a kind of metaphysical fiction that such a separation of the essential feature or features from the agreeing objects is supposed possible. Nevertheless, abstract names serve a very important use. They give us a great power of abbreviation and save us the necessity of resorting to circumlocutory language, and this accounts for their being found largely in all languages. There is an abuse, however, to which abstract names are liable and to which we have already alluded. They suggest that the points of community exist in nature apart from the agreeing objects. People are led to suppose that *justice* is something disembodied, existing in nature independently of just actions. This is erroneous.

† We may speak, no doubt, of Cæsarism, Kantism, Hegelianism, Spencerism, &c., but, in each of such cases, it is only a type of character or thought that may possibly belong to a whole class, that is represented, and not all the differentiating marks of the particular individual denoted by the proper name from which the abstract is formed. Thus, strictly speaking, the abstract, in each case, is formed only from a general name.

or apart from all relation to other names, we cannot sometimes positively say that they are either concrete or abstract. How shall we call the names of those attributes of which other attributes may be predicated? In so far as they are themselves attributes that may be predicated of other subjects, they are abstract, and in so far as they are subjects of other attributes, they are concrete. It is to include such cases that we defined '*thing*' as the '*subject of attributes*.' In the example, 'warmth is agreeable,' warmth is the subject of which the attribute of agreeableness is predicated; but warmth itself is the attribute of all warm objects. So also, when different kinds or degrees of an attribute are mentioned, as when we speak of physical courage and moral courage, or of different shades of whiteness, the name of the attribute is to be viewed as concrete. Thus, while there are some names which are concrete and never anything but concrete, there are others which are abstract in one relation and concrete in another. Dr. Keynes points out that on account of this circumstance the distinction between concrete and abstract reduces itself to insignificance.

This use of the same term as both abstract and concrete, should be distinguished from the use of a term which was originally abstract, as concrete. While there is the word *relative* to denote a person who stands in some kind of kinship to another, the word *relation* which must properly denote the position between them, is used in its stead, and the word *relationship* is invented to perform the function of

*relation*. Jevons gives numerous examples of this kind. The *products* of a country are also spoken of as the *productions* of the country. A *nation* is spoken of as a *nationality*, by a gross abuse of language. Even Logicians, he says, are to blame for their application of the terms, *propositions*, *inductions* and *deductions*, to particular propositions, inductions and deductions.

The next question is, whether the distinction between Generals and Singulars can be applied to Abstract names. There is a difference of opinion among Logicians on this point, and it is believed by some, such as Mill, that some abstract names are certainly general, such as, colour, shape, size, &c., which refer to various colours, shapes, sizes, &c.; while others, such as, inkiness, squareness, visibility, equality, restoration, &c., which refer to one quality, or circumstance, are singular. Jevons, however, holds that abstract names can never be general, and when we distinguish different kinds or degrees of colour, we render the term so far concrete. Generalisation, or the formation of a class, is always based on a single property, or on many properties. In any case, the resemblance is to be regarded as a unity, "the one in the many," and the name designating it should be regarded as singular. If a name is given to a number of objects *on account of* a common quality or qualities, that name is a general name; and the name given to the *resemblance*, considered apart from the objects, is the abstract name; and when the common qualities are more than one, the name denotes all

those qualities viewed as one. It is hence erroneous to say that *humanity* is general, because the attributes comprised by the term are *all* of them possessed by *every one* of the individuals denoted by the corresponding concrete term, *man*. In those cases in which the name seems to be applicable severally to several attributes, it must be so applicable on some distinguishable ground or reason. If it is so, then the name becomes a general name, no doubt, but it ceases to be abstract in that relation, the name designating the ground or reason being the corresponding abstract name. Abstract names, as abstract names, *i.e.*, as names of abstracted quality or qualities, are therefore essentially singular. They should be carefully distinguished from general names. A general name, besides expressing an object, expresses also the attributes of that object; or, technically speaking, *denotes* a number of objects, and *connotes* the attributes possessed in common by those objects; but an abstract name expresses only the attributes, or *denotes* simply the attributes without *connoting* anything. Also, a general name is opposed to a singular name; an abstract name is opposed to a concrete name, whether general or singular.

Again, what term is the *adjective*, '*white*'? Is it concrete or abstract? This is determined by its use in a proposition. If it is used as the subject, as in '*white* is an emblem of purity,' then it stands for *whiteness*, and hence it is an abstract term. But, if it is used in predication (which is its chief function), as in '*the cloth is white*,' it is concrete. In this instance, *white*

does not stand for whiteness and we do not mean to say that cloth is a white colour ; but we mean that cloth is a *white thing*, a thing which possesses white colour. *White* denotes all objects possessing white colour and *connotes* this attribute also which is termed *whiteness*. Thus we see that all adjectives are concrete terms. The adjectives human, rational, virtuous, wise, cruel, &c., refer to beings that possess respectively humanity, rationality, virtue, wisdom, cruelty, &c.

When an adjective occurs in combination with an abstract name, as *great strength*, or with a singular name, as Alexander the *great*, Dr. Keynes points out that the whole combination may be abstract or singular, but that " it does not follow that the adjectives considered by themselves need be regarded as abstract or singular, any more than that such a term as *man* is itself singular, because it forms part of the singular term, *the first man*."

#### 4. Connotative and Non-connotative terms.—

This distinction between abstract and general names suggests to us another division of names, namely, that into *Connotative* and *Non-connotative* terms. A connotative name is a name which, in addition to denoting or designating a subject, implies also an attribute. A name generally designates an object, and a connotative name, besides performing that function, performs also another function, that of implying an attribute or attributes. Hence the phrase, ' to connote,' which we have used more than once, means to note together, to signify as additional, an attribute. The word *man* is a connotative term, because it



denotes a human being, and also conveys to our mind some attributes, such as, corporeity, erect stature, a certain disposition of features, &c. The word *tree* likewise denotes an object and connotes some attributes. *White*, besides denoting all white things, connotes the attribute, *whiteness*. City, fort, round, broad, &c., are connotative names. These names, when they are pronounced to us, bring to our mind the objects to which they can be applied, and also remind us of some quality or qualities possessed in common by those objects. All class-names, therefore, definite and indefinite, and all adjectives, are connotative names.

Connotative names have thus a two-fold meaning, the meaning in extension and the meaning in intension. The meaning of a word in *extension* is the sphere which it embraces, the number of objects which it includes; and the meaning of a word in *intension* is the aggregate of attributes or qualities which it implies. The meaning of the word *man* as applied to a number of human beings is its meaning in extension, but its meaning as signifying the attributes that justify the appellation, is its meaning in *intension*. Why do we speak of a particular human being as a man? Because he possesses corporeity, animal life, rationality, erect stature, &c. This is the meaning of the general name *man* in intension. It is the meaning which also distinguishes the object denoted by it from other objects. These two aspects in the meaning of a word have been expressed under various names by Logicians. Connotation, Intention, Intent, Comprehension, Depth, Implication and Force are all words employed to

signify the common qualities possessed by a class of objects. Denotation, Extension, Extent, Sphere, Breadth, Application and Scope are used to denote the whole range of objects themselves to which the name is applicable. Of these words, Connotation and Denotation have been rendered definite in their signification by Mill and popularised by him. Further, they express by their etymological meaning what we want to express when we use them. Thus, Denotation (Lat. *de*, down; *notare*, to mark) is the aggregate of objects 'marked down' by the name; while Connotation (Lat. *con*, with; *notare*, to mark) is the attribute or aggregate of attributes 'marked with' those objects. This distinction between the two meanings of words must be carefully borne in mind.

(a) *The meaning of Connotation.*—The controversies regarding the connotative character of names may be attributed to a large extent to a want of mutual understanding on the part of logicians as to which of the attributes belonging to a whole class are regarded by them severally as constituting the connotation of the corresponding class-name. The following views have been held:—

(1) There is first the *conventional* view, according to which all those attributes are included in the connotation which have been conventionally agreed upon as determining the application of the class-name. They are the *attributes which form the groundwork of the classification, and without any one of which the name would not be applicable. They are implied in the meaning of the name.* It may be that all ruminant animals are cloven-hoofed, but cloven-hoofed is no part of the meaning of ruminant, and, as Mill says, were an animal to be discovered which chewed the cud,

but had its feet undivided, it would still be called ruminant. This is Mill's view, and is generally adopted.

(2) By some writers connotation is made to include those attributes of the class which are associated with the name in the mind of any given individual. It is thus rendered wholly subjective and relative, while it ought to be objective, and, as far as possible, fixed. The attributes associated with the name in the mind of one individual may not be the same as those associated with the name in the mind of another, and, even in the case of the same individual, what the name suggests to him at one time may be different from what it suggests to him at another. These attributes, again, may not be all the attributes implied by the name, and may include some not implied by it. Proper names may be held to be connotative on this view.

(3) According to another view, connotation includes all the attributes, known and unknown, which are possessed in common by all members of the class. The standpoint here is objective. Just as the denotation of 'man' includes a wide range of individuals, known and unknown, so its connotation must include all the properties belonging to the class, known and unknown. These will certainly be more numerous than the properties comprised under either of the two foregoing heads. Jevons holds this view of connotation. "A term taken in intent (connotation) has for its meaning the whole infinite series of qualities and circumstances which a thing possesses. Of these qualities or circumstances some may be known and form the description or definition of the meaning; the infinite remainder are unknown" (Pure Logic, P. 6). On this view also proper names may be held to be connotative.

Using *Intension* to indicate in the most general way the implicational aspect of names, Dr. Keynes expresses the three meanings of connotation above indicated by the following complex terms: *conventional intension*, *subjective intension* and *objective intension*. For the first of these he reserves the word *Connotation*, uses *Comprehension* as equivalent to the last, and does not think it necessary to invent a single term for *subjective intension*, as this is less important than either of the other two.

(4) There is yet a fourth sense in which the word *Connotation* has been used. Dr. Bain includes in it not *all* the attributes common to the class, but all the *ultimate and independent attributes* from which the other attributes of the class can be deduced. Connotation in this sense is wider than conventional intension.

(b) *The meaning of Denotation.*—The denotation of a name is *the number of individual things to which the name is applicable in the same sense*. This implies that the denotation is determined by the connotation. But it must be remembered that the connotation of any name is, in the first instance, obtained only by a comparison of many objects which form part of its denotation. In fact, in Material Logic, it must be supposed that the connotation of a name is subject to occasional re-adjustment by the dropping of some old individuals and the adding of new ones, as the progress of science may require such re-adjustment. But in Formal Logic, it is necessary that every name should be used with a fixed meaning throughout, whether this be the ordinary meaning of the name, or some special meaning which may be attached to it. "Formal Logic is indifferent to what particular connotation is attached to any given term; but it prescribes absolute consistency."

Dr. Venn holds that names like Centaur, Griffin, &c., possess denotation but that this must be sought in their appropriate sphere of existence, namely, that of mythology, fable, &c. But he is of opinion that it is inappropriate to speak of denotation in the case of purely mental concepts, such as a mathematical circle which has never been exactly drawn. It is, however, difficult to see why, if existence can be extended to include mythological existence, it should not also be extended to include existence in imagination, as such circles can be imagined, though not actualised. He also holds that the name of an extinct animal, like the Dodo, cannot be held to have any denotation *now*. Its denotation is limited in time. But it is better to adhere to the common usage of denotation, and include under it all the things to which the name can be correctly applied, whether they are limited in time or not, whether they exist in the world of actual fact, or only in that of imagination.

(c) *The mutual dependence of Connotation and Denotation.*—An important fact regarding this distinction in the meaning of a word must be noticed. The more general a word is, the less does it connote, and the less general it is, the more does it connote. The greater the denotation, the less the connotation, and the less the denotation, the greater the connotation. We shall first illustrate the law in the case of two different but related words. Take, for example, the word *animals*. This word is more general than *man*. It denotes all the created beings in the universe possessing life and sense, or, at least, the power of digesting food and exerting force. Such beings are numerous. The signification of the word *animals*, therefore, in extension is very wide, but in intension it is very narrow. The word *man*, however, which is less general than *animals*, is less wide



in extension, but less narrow in intension. In extension or denotation it excludes from the sphere of animals all the beasts, birds, insects, reptiles, and the like, and marks out only the rest, the human beings. In intension, however, it connotes a larger number of attributes than animals. It connotes, for instance, besides the possession of life and mobility, other attributes which are the distinguishing features of man, the *differentia* marking out the species *man* from the genus *animals*. Another pair of words is element and metal, the former more general than the latter, but connoting a less number of attributes. There are specific attributes which are connoted by the term *metal* in addition to what is connoted by *element*. Similarly, quadrupeds and horses, institutions and schools, buildings and houses, military arms and dagger, and the like, are illustrations of the law in the case of two different terms. Now in the case of the same word the same law holds good. *As the intension is increased, the extension is decreased, and as the extension is increased, the intension is decreased.* The latter part of the law is very well illustrated by the ripples formed on the surface of a pool of water, whose force abates the more they widen. The word *men* embraces a certain number of human beings possessing a certain number of attributes. Increase the number of attributes, say, by means of the epithet *wise*, then the sphere of men is narrowed. Wise men are fewer in number than men. Increase it again by means of the epithet *intelligent*, the sphere becomes still narrowed. Wise and intelligent men are fewer in number than wise men alone. The sphere of *metal* can be similarly narrowed by means of the epithet *valuable*. The extension will similarly decrease in the case of the terms sheep,



schools, houses, and dagger, by the addition of the epithets white, sanskrit, tiled, and steel respectively.

It must not, however, be supposed, that there is any exact proportion between the degree in which one meaning is increased, and that in which the other is decreased. Increasing the intensive signification of *metal* by means of the epithet *red*, we decrease the extensive meaning much more than if we should increase it by means of the epithet *white*, since there are twelve times as many white metals as red. Similarly, the term white men is infinitely greater in extension than the term blind men. Thus, in increasing the intension of a term we may decrease the extension to any degree. We cannot halve the connotation or double it, and correspondingly also halve the denotation or double it, and *vice versa*. Again, every increase to the connotation does not decrease the denotation. It is useless to prefix to a name an epithet which signifies an attribute already implied by the name. We cannot decrease the denotation of 'men' by the epithet 'living,' since life is an essential attribute of all men. Even by prefixing 'mortal' to 'men,' which is not an essential attribute, we do not decrease the denotation, for 'mortality' is a property belonging to the whole class of men. Whether you increase the connotation by a property which is deducible from one or more of the essences and co-exists with them, or by one which, not being so deducible, is yet always to be found with them, you do not decrease the denotation. Increasing the connotation and decreasing the denotation is the process of Specialisation, while the opposite process is the process of Generalisation.

Now we shall resume the distinction between Connotative and Non-connotative names. A connotative term, we have said, denotes a subject and implies an

attribute or some attributes. A non-connotative term performs either of the two functions, and not both. It merely denotes a subject or an attribute. By a subject is meant anything which possesses attributes; and by an attribute is meant everything which belongs to the subject.

From this definition it is clear that all general names are connotative, because they denote certain objects, and imply that those objects agree in possessing certain attributes. In fact, a general name is applicable to a number of objects only because they possess certain attributes in common. The name would not be applicable in the absence of even one of these attributes. The name 'man,' for example, cannot be applied, as Mill says, to a race of animals possessing the form of an elephant, but possessing all the other attributes of humanity. Thus, the name signifies all the attributes of humanity without exception, besides denoting all the subjects which possess those attributes. But it can be predicated only of the subjects, *i.e.*, the individual men which it denotes, and not of the attributes. We can say 'John is a man,' 'Robert is a man,' &c., but not 'rationality is a man,' 'corporeity is a man,' &c. The name, therefore, signifies the subjects *directly*, *i.e.*, denotes them, and signifies the attributes *indirectly*, *i.e.*, implies or connotes them. All adjectives are to be classed as general names, and hence as connotative. *White* means all white things, and can be predicated of them. We can say 'snow is white,' but not 'whiteness is white.' Secondly, all significant singular

names, as the name itself imports, are connotative. 'River' is a general name, and hence connotative. 'The longest river in Asia' is a singular name, but we have made it singular by adding to the signification of the general name, river. It is, therefore, a connotative name. Thirdly, all proper names are non-connotative, according to Mill, but connotative, according to Jevons, Mr. Bradley and others. Fourthly, all abstract names are non-connotative, according to Jevons, while some abstract names are regarded as connotative by Mill and others.

(d) *Are Proper names Connotative?*—Mills peaks decisively on the question as follows:—

"Proper names are not connotative: they denote the individuals who are called by them; but they do not indicate or imply any attributes as belonging to those individuals. When we name a child by the name of Paul, or a dog by the name of Cæsar, these names are simply marks used to enable those individuals to be made subjects of discourse. It may be said, indeed, that we must have had some reason for giving them those names rather than any others; and this is true; but the name, once given, is independent of the reason. A man may have been named John, because that was the name of his father; a town may have been named Dartmouth, because it is situated at the mouth of the river Dart. But it is no part of the signification of the word John, that the father of the person so called bore the same name; nor even of the word Dartmouth, to be situated at the mouth of the Dart. If sand should choke up the mouth of the river, or an earthquake change its course, and remove it to a distance from the town, the name of the town would not neces-

sarily be changed. That fact, therefore, can form no part of the signification of the word; for otherwise, when the fact confessedly ceased to be true, no one would any longer think of applying the name. Proper names are attached to the objects themselves, and are not dependent on the continuance of any attribute of the objects."

Thus, Mill considers all proper names as non-connotative. Jevons objects to this view, but his objections cannot be held to be valid as against Mill who holds that the connotation of a name embraces all the essential attributes implied by it.

Jevons says (Principles of Science ii, p. 27),—"Logicians have erroneously asserted, as it seems to me, that singular names are devoid of meaning in intension, the fact being that they exceed all other terms in that kind of meaning." Again, he says (Studies in Deductive Logic, pp. 2, 3),—"There would be an impossible breach of continuity in supposing that, after narrowing the extension of 'thing' successively down to animal, vertebrate, mammalian, man, Englishman, educated at Cambridge, mathematician, great logician, and so forth, thus increasing the intension all the time, the single remaining step of adding Augustus de Morgan could remove all the connotation, instead of increasing it to the utmost point." No one ever denies that some singular names are connotative. Mill *does* recognise this fact. They are general names specified or restricted or narrowed down by means of attributes till they are individualised, as, 'the present Professor of Pure Mathematics in University College, London.' But the question is not, whether singular names are connotative or not, but whether proper names strictly so called are connotative or not. Dr. Keynes remarks with reference to these two passages that Jevons tends to obscure the point at

issue. G. C. Robertson seems to be of the same opinion. But Jevons seems to hold that proper names do not differ logically from singular names. It may reasonably be asked if there is no difference even for logical purposes between 'Augustus de Morgan' and 'the present Professor of Pure Mathematics in the University College, London.' Does the former name, as such, imply all that the latter connotes? Are not cases conceivable where the latter name alone will be suitable, and not the former? Nor could the name have been given to that Professor *on account of* the attributes which he only latterly acquired. The latter name would cease to apply, the moment the individual ceases to perform the functions specified.

It is asked, if the name John Smith does not suggest to my mind the qualities of John Smith, how shall I know him when I meet him? But a name should not be called connotative simply because it *suggests* to those that have known the individual denoted by it certain attributes or circumstances by which they can recognise the individual. I may recognise a Brahmin by his dress, but this does not form part of the connotation of Brahmin. It is only when the name is given on the ground of those attributes and *implies* those attributes, that the name may be said to be connotative. The name must have been invented to designate the attributes and must *imply* them. It is said also that the name John Smith at least connotes that he is a Teuton and is a male. This is not always so. John Smith may be the name of a dog, or the pseudonym of a woman. In many instances of naming, the parents give to their children such names as they have a fancy for, or as at random suggest themselves to them. There are no doubt cases in which a name is given on account of a

reason. But, as Mr. Mill remarks, *a name once given is independent of the reason*. It may be that the reason vanishes after some time owing to some cause or other, and still the name would be applicable. A man might have been called Armstrong, because in his youth he was strong in the arm; but if he grew weak, the name would not be taken from him. It would even be given to his descendants, however puny they might be. Even though the course of the river Dart should be diverted, Dartmouth would still be called Dartmouth. To say that it still bears a meaning, the meaning that it is now a place that was *originally* situated at the mouth of the Dart, is to confound the *history* of the name with its *meaning*. Supposing a number of changes of a similar nature to come about, then, according to Jevons, the meaning of the name would be so far changed. An everchanging connotation is no connotation. When, however, proper names are used to denote a certain type of person, they are connotative; e.g., a Socrates, a Solon, a Solomon. But the moment proper names are so used, they cease to be proper names strictly so called, and become general names.

Names, such as, President Kruger, Professor Ramsay, Captain Knox, are only partially connotative. They occupy an intermediate position between Significant Singular names, and strictly Proper names. A change in the conditions of the individual named will render the name inapplicable. The President may cease to be President, or the Captain may become Major.

Thus, we reach the following conclusions:—(1) Proper names are non-connotative, and should not be confounded with Significant Singular names which are admittedly



connotative. (2) If a proper name *suggests* certain marks or attributes, these marks or attributes may form the subjective intension of the name, but can never constitute its connotation or meaning. They are not implied by the name. They may differ with different people according to the extent of their knowledge about the individual, and hence cannot be the meaning of the name. *Implication* should not be confounded with *suggestion*. If by connotation is meant either subjective intension or comprehension, one or other of which appears to be what Jevons himself means, then a proper name may be held to be connotative. But Mill means by connotation those essential attributes which the name is a mark of in the general mind. (3) A proper name, such as, John Smith, does not even imply that he is a Teuton, and a male; it may be the name of a dog, or a ship. (4) Even when a proper name is given for a reason, it subsequently becomes independent of the reason. (5) Proper names, denoting particular types of character or thought, are, strictly speaking, general names, and are hence connotative. (6) Names like Captain Knox are partially connotative.

(e) *Are Abstract names Connotative?*—They are not. When they are names of attributes, which themselves possess attributes, *i.e.*, which are subjects of which other attributes may be predicated, (these attributes being the ground of their applicability to other attributes which they *denote*) they are connotative no doubt, but they are not abstract. They are to be viewed as concrete in that relation.

5. *Positive and Negative terms.*—Terms are either positive or negative. A positive term implies.

the presence of a quality or qualities, whereas a negative term implies the absence of those qualities connoted by the corresponding positive term. *Animate*, *popular*, *man*, and *sectarian*, are positive terms. *Inanimate*, *not-popular*, *not-man*, and *non-sectarian*, are negative terms. But this is not all the definition. It assumes that positive and negative terms are only connotative. The fact is, they can also be non-connotative. *Whiteness* is a positive term. *Not-whiteness* is a negative term. Cæsar is positive, not-Cæsar is negative. Mill and Jevons say that if the universe of existing things be represented by a circle, and if Cæsar be represented by a smaller circle within it, then not-Cæsar will be represented by the remaining portion of the bigger one. A negative term describes, according to them, all that is not referred to by the positive name. It includes everything in the universe except that which is denoted by the positive term. It does not definitely mark out and determine the person, object or quality. Suppose the answer to the question, who is there? is 'Not-Cæsar.' It is as vague or indefinite as anything in the world. Hence Whately calls it an *infinite* or *indefinite term*; and he calls the positive term a *definite term*. Dr. Bain and De Morgan, however, agree in thinking that not-whiteness does not refer to all things whatever in the universe except whiteness, but to all colours except white colour. With them, the universe of discourse is restricted, and is in this case, *colour*. Similarly not-Cæsar would refer to all persons

except *Cæsar*.<sup>\*</sup> To resume our point, positive terms and negative terms may both be thus either concrete or abstract, connotative or non-connotative. But, as we know, any term cannot both be abstract and connotative. A negative term is connotative, inasmuch as it connotes the attribute of not possessing that attribute connoted by the positive term.

---

\* Dr. Keynes holds that it is erroneous to suppose that the universe of discourse exhausted by *white* and *not-white* is necessarily limited to the proximate genus of which *white* is the species, *viz.*, colour. He says that the argument by which this view is upheld is faulty, namely, that it is an impossible feat to hold together the most diverse things under one idea; because the diverse things are not held together by means of any positive elements that may belong to them, but they are held together by the single feature of their not possessing a particular quality or qualities. But, it may be asked, can it refer to things to which the attribute negated is inapplicable? No doubt, the test of what a name denotes is what it can be predicated of. But, can *not-white* be predicated of a *sound*? If it can, of what use is a proposition of this kind (*e.g.*, *sound is not white*) in Logic? In practice, no one ever forms such a combination, and Logic, if it is to serve any practical ends, cannot recognise it as of any value. No doubt, a purely negative term can only mean in Formal Logic whatever is not denoted by the positive term. Not-X can only mean everything in the universe except X. But the moment we know what X is made to stand for, we understand the limited universe to which reference is made. In fact, there would be no real contradiction between *white* and *not-white*, if the latter is made to include everything else in the universe except *white*. Heavy, strong, valuable, round, &c., are all included in *not-white*, and yet are they all compatible with *white*. They may all exist in the same subject with *white*.

The division into positive and negative is a purely logical means of expressing contradiction, and its justification consists in excluding any third alternative between two contradictory terms. These must between them exhaust the universe under consideration, and must also be mutually exclusive. The *signs* by means of which we usually distinguish the negative terms in common language, are the prefixes *im* or *in*, *un*, *not*, *non*, *mis*, &c., as corporeal, incorporeal; sensible, senseless; metallic, non-metallic; regular, irregular; moveable, immoveable; fortune, misfortune; &c. But some of these prefixes are not always safe guides. In many cases, they have ceased to indicate true negation, except where no third alternative is possible, as in equal, unequal. Where such an alternative could be formed, the negative term has tended to express something more than mere negation, something as truly positive as that indicated by the corresponding positive term. 'Happy' and 'unhappy' are not contradictories; there is the intermediate state of indifference. 'Unhappy' does not merely mean 'not-happy,' but signifies a state of positive discomfort, though not one of deep misery. The word 'inauspicious' does not merely mean 'not-auspicious,' but denotes the presence of something likely to work out evil. 'Unpleasant' implies 'positive pain.' 'Unkind' is something worse than 'not being kind.' Uncomfortable, inconvenience, unhealthy, unholy, misfortune, senseless and unrighteous are other words of the same description. In neither of these cases do the positive and the

negative together exhaust the related universe. They are not simple negatives of the corresponding positive terms, but they are positive terms themselves, though negative in form. Common language also affords instances of words being positive in form while they are negative in force. 'Weakness' means 'absence of strength.' 'Idle' is 'not working.' In some cases, the negative prefixes and suffixes do not imply the negation of any attribute at all. 'A shameful action' and 'a shameless action' both mean the same thing. The prefix *in* in 'invaluable' is used intensively. 'Unloosed' is not the negative of 'loosed,' but is synonymous with it.

Since sharp distinctions are not thus marked off in common language, Logic has found it necessary to avail itself of the most unmistakable signs of negation, 'not' and 'non' for forming negatives from terms. 'Not-happy' simply excludes 'happy.' 'Non-human' simply excludes everything that is human, and is not the same as 'inhuman.' From the mere form of any pair of terms, then, we can say which is positive and which negative. That which has the negative particle is negative, and that which is without it is positive. This is the definition of positive and negative in *strict formal logic*.

This Formal or Logical contradiction is to be distinguished from Material contradiction which exists between two terms wholly different in form, and which can hence be known only from a knowledge of their meaning. Such terms are also mutually exclusive, and they also exhaust a universe of discourse; but their form does not indicate

that they are contradictories. Each is the name of a class which is important in itself, and has a distinct connotation. We must know the connotation of each in order to know that contradictory relation exists between them. In formal contradiction, it is enough if we know the connotation of one of the terms—the connotation of the other is simply negative. But, in material contradiction, we must know the connotation of both. The material contradictories always refer only to a limited universe which may be very wide, as in male and female (living beings), or less wide as in British and Foreign (products in general), or still less wide as in Briton and Alien (persons only). The denotation of the limited universe decreases and its connotation increases. But, for Logic, such material contradictories are all to be regarded as positive, since they all possess a connotation implying the presence of certain attributes.

Negatives and Opposites ought not to be confounded together. In the case of positive and negative terms, as we have seen, no medium stage is possible. We have no medium stage between corporeal and incorporeal, because this relates to quality. But in the case of opposites, we *have* intermediate stages, because they refer to degree or quantity. Between heat and cold, there is an intermediate state. Between agreeable and disagreeable, there is an indifferent stage. Between greater and less, there is the state of *equality*. Wise and foolish, happy and miserable, rich and poor, pleasant and unpleasant are also pairs of opposites, or *contraries*. They are extremes expressing the greatest possible difference in the same universe, and admit of different degrees of intermediate stages. Thus two contraries, though they cannot both be true of the same thing at the same time, may yet be both false. This

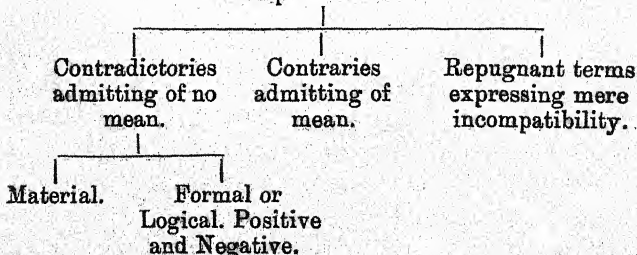


distinction is material, and cannot be represented symbolically in the way in which the distinction between positive and negative can.

Logicians also speak of *privative* terms. These imply the non-possession by an object, of a quality or attribute which it is capable of possessing, or which it once did possess; as *blind*, *dumb*, *deaf*, &c. Privative terms, therefore, connote two things, "the absence of certain attributes, and the presence of others, from which the presence also of the former might naturally have been expected." But the recognition of these names as a separate class is of little logical importance, and some logicians have even used *privative* as equivalent to *negative*.

We have spoken of contradictory terms (material and formal) and contrary terms. There is yet a third class of terms recognised by some writers, namely, *Repugnant* terms, which express mere incompatibility without being directly contrary, or contradictory of each other. 'Not-white' includes red, blue, yellow, &c., no two of which can be predicated of the same subject at the same time. Other writers, however, use the word 'contrary' in a wider sense so as to include these repugnant terms. Blue and yellow, equally with black, would be regarded by them as contraries of 'white.'

#### Incompatible terms.



6. **Relative and Non-relative or absolute terms:**—The word *relative* is from Latin *relativus*, related; hence a relative term is the name of a thing which is related to some other thing. An absolute term, on the other hand, (L. *ab*, from, and *solutus*, loosed) refers to a thing which stands alone without any special kind of relation to any other thing. The relation that is meant here is not that kind of relation by means of which our very knowledge of things is acquired. In this way every word in the English language is a relative term. Our knowledge of *fire*, which in Logic is an absolute term, is our discrimination of it from other things. Our knowledge of a round object is our discrimination of it from objects that are square, oblong, triangular, &c. According to the law of Relativity, every object in the universe is known only as related to some other object. It is not this relation that is meant here. It is a special kind of relation which strikes us at first thought, and which grows out of the complicated arrangements of the world. Fire, earth, table, water, clock, &c., are absolute terms. Master and servant; tutor and pupil; monarch and subject; principal and subordinate; father and child; cause and effect; like, like; equal, equal; &c., are pairs of relative terms. We see that in each of these pairs some special kind of relation subsists between the members. We do not think of 'master' without at the same time thinking of 'servant.' 'Tutor' cannot be thought of in separation from 'pupil.' The idea of 'monarch' suggests to us the idea of 'subject.' The meaning of 'princi-

pal' implies a subordinate. Father implies child. Cause implies effect, and so on. Thus the characteristic feature of these relatives is their inseparability in thought. A relative term, then, may be defined as a term which, besides denoting an object, *implies in its signification* the existence of another object to which reference must be made while explaining it. Mere existence of a special relation is not enough to make terms relative. The terms themselves must imply the relation in their meaning. 'Monarch' and 'man' do not imply each other; but 'monarch' and 'subject' do. Each of a pair of such terms is said to be the correlative of the other. Master is the correlative of servant and servant is the correlative of master. When we predicate of a certain person that he is the master, we are compelled in thought to recognise another person as his servant. Suppose Robert is the master and William is his servant. There are here two distinct words, master and servant, one the correlative of the other, that are predicated of two different persons. The same person may be master and servant, but not at the same time. But, in the example, 'Robert is *like* William,' the two different persons of *both* of whom the word *like* is predicated are Robert and William. The correlative of *like* is *like* itself, because each of the *like* members is *like* the other. Similarly, *friend*, *partner*, *equal*, *near* are other terms which are their own correlatives, the relation looked at from either point of view, being exactly the same.

All relative terms are connotative, but not in the

same sense in which general names are. A relative term, *as implying another*, cannot connote a peculiar attribute. It must connote its relation to that other term. That relation no doubt implies a number of circumstances, causal or other, by means of which the two members are inextricably blended. The serial circumstances from which must have sprung the relation as at present subsisting between a tutor and a pupil, and from which both these names must have been derived, constitute the basis of the connotations of both *tutor* and *pupil*. The relation between tutor and pupil, looked at from the point of view of tutor embodies the same circumstances as the relation between the two words looked at from the point of view of pupil. But they cannot be said to connote the same attribute. To be a tutor is not the same thing as to be a pupil. The series of physical events above referred to, constituting the ground of the correlative names, is called *fundamentum relationis*, or the foundation of the relation. In the case of *husband* and *wife*, the series is constituted by the facts of the marriage tie; and in that of *shepherd* and *sheep*, it means the acts of tending and watching. The abstract names which denote the circumstances upon which the relation depends, are not correlatives, because they do not denote two facts, but only one fact. Tutorship and pupilage are not correlatives, and this will be apparent in those cases in which the same name expresses both the members. 'Friend' implies another person as friend, but friendship, the bond between

them, denotes the same set of circumstances viewed from either side.

7: **Univocal and Equivocal.**—*Univocal* terms are those that are of but one meaning. All scientific and technical terms, such as humerus, sternum, liver, oxygen, nitrogen, carbon, botany, phosphorus, &c., all household terms and all proper names are univocal. These terms present little or no difficulty in Logic. All our concern is only with *Equivocal* terms. These are terms that are capable of more meanings than one. By being employed in different senses, they cause much confusion. Equivocation arises solely from the manner of employing names. Light is not darkness. Feather is light. Therefore feather is not darkness. In this reasoning, light is employed in two different senses. It can be employed in one sense alone. In fact, all equivocal terms can be employed so as not to be susceptible of being understood in the several senses of which they are capable, and so as to restrict our attention only to one of them. *Logically speaking*, an equivocal term is not one term, but as many terms as the meanings of which it is capable. It is a defect of language that all these meanings are expressed only by one term.

Now, the student will remember that every word is either

- (1) *Categorematic* or *syncategorematic*;
- (2) *General* or *singular*;
- (3) *Concrete* or *abstract*;
- (4) *Connotative* or *non-connotative*;
- (5) *Positive*, *negative* or *privative*;
- (6) *Relative* or *absolute*;



and he must exercise himself by describing the logical characters of words, such as inestimable, scenery, honesty, Solomon, senate, green, university, planet, meteor, splendid, majesty, heavy, virtue, circular, ore, flock, shepherd, bevy, cattle, brother, iron, square, Asia, system, nature, natural, naturalist, human, humanity, autocrat, truth, author, time, space, infinity, deaf, doorway, earthly, relativity, rational, relationship, relative, equal, equality, equation, equanimity, industry, gain, indiscreet, science, intention, beer, the President of the United States, the Republic of China, Emperor of Switzerland, &c.

In describing the logical characters of a word, the student should first ascertain whether the word can be employed by itself as the subject or the predicate of a proposition. If it can be so employed, he should call it *categorematic*. Then, he should proceed to describe its nature with reference to the other divisions of names above enumerated. If the term happens to be ambiguous, then he should describe its logical characters in accordance with the different meanings of which it is capable, but always in the order of their importance.

*Examples.*

1. '*Humanity*':—This is clearly *categorematic*; singular and abstract as it denotes the quality of being human; non-connotative; positive; absolute. If it is understood in the sense of 'mankind,' then, all other characters being the same, we call it 'collective' and also 'connotative.' In the sense of 'the quality of being humane,' its characters are the same as in the first case.

2. '*Heavy*':—*Categorematic* since a substantive is understood after it; general; concrete; connotative; positive; absolute.

3. '*Equal*':—*Categorematic*; concrete as denoting equal things; general; connotative as connoting the attribute of equality; positive; relative as it implies another thing equal to it.



4. '*Equation*':—Originally abstract as meaning either equality, or the action of making equal. It is now applied to a pair of quantities affirmed to be equal. Hence categorematic; general; concrete; connotative; positive; absolute.

5. '*Equality*,' '*equalness*,' and '*equalisation*':—Categorematic; singular; abstract; positive; non-connotative.

6. '*Inequality*':—Same as the above, but negative.

7. '*University*':—Categorematic; collective either as referring to the several colleges composing it where the several sciences are taught, or as referring to persons forming a corporation as in this country to confer degrees alone; general as referring to the several universities; concrete; connotative; positive; absolute.

The student must also note the changes in the connotation and denotation of words in a series like the following:—

1. Figure, four-sided figure, square.
2. Created things, animals, men, soldiers.
3. Body, solid body, rock, marble.
4. Religionists, Christians, Protestants and Puritans.
5. Figure, rectilineal figure, triangle, equilateral triangle.
6. Matter, solid, stone, precious stone, ruby.
7. Animals, invertebrates, insects.
8. Means of communication, road, railway.

These ascend in connotation and descend in denotation. The student is recommended to write down each of these in the inverse order and note the changes. He may also invent similar examples himself.

---

## CHAPTER III.

## AMBIGUITY OF TERMS.

1. **General Remarks.**—The existence of ambiguities in the diction of a language is a serious drawback of the language itself. One of the uses of language is to aid the process and development of thought. Any imperfection, therefore, in the former will be a check upon the latter. Though it may be possible to think without the aid of language to some extent, yet the deeper thoughts, as we have seen, do require its aid. These will vanish from our minds immediately after they are generated, if they are not fixed or chained down by language. This process of fixing down must be as precise and definite as possible since, otherwise, much confusion will result. Communication of thoughts, which is so important for the logician, cannot be accurately carried on in the absence of well-defined and unambiguous modes of expression. Every language, for all philosophical purposes, must therefore be *precise* and *perfect*. Precision and perfectness consist in the following particulars:—

(1) Every general name must have a definite meaning, and one only.

(2) Every notion must have its own word and only one. Sometimes also, a simple or a complex notion may be expressed by means of a phrase, which phrase, however, must definitely and distinctly circumscribe the idea. Language, in this state of perfection, performs accurately enough the functions already mentioned, namely:—

(1) That of enabling us to form general notions, simple and complex, and of retaining them in our minds, thus facilitating the processes of thought and advancing knowledge.

(2) That of enabling us, again, to split up highly complex notions into their constituent parts.

(3) That of shortening the processes of thinking.

(4) As a record of our analyses and investigations for future reference, and

(5) As a means of communication.

But, in its imperfect and redundant state, it creates great confusion and perplexity. The English language is known to be such a language, and is full of ambiguities. In the foregoing Chapter we referred to the existence of ambiguities in the English language as one of the reasons for the usual practice with Logicians of commencing their treatises with an examination of names. It is a matter of absolute necessity for every beginner in Logic to make himself familiar with the defects or imperfections of the sole means by which reasoning is conducted, just as it is necessary for the learner of every profession to acquaint himself first with the imperfect nature of the tools which he has to employ.

2. Ambiguity: its nature and origin.—Words are often indeterminate in their signification, and it becomes difficult, when they are used in particular contexts, to know their exact meanings. And this indeterminateness in signification not only gives rise to accidental confusion, but is also deliberately much

abused, such words being employed equivocally where they ought to be employed so as to make them suggest only one meaning. They are called ambiguous, because they seem as if they wander about, being uncertain in their signification (L. *ambigere*, to drive about or to wander irresolutely). Their ambiguity may arise from several causes, one of them being the urgent necessity of riveting in language new thoughts or ideas that may in some manner be originated. Language is the means by which we express external objects, their attributes, the relations among those objects, as well as those subsisting among their attributes, and the workings of our mind upon those objects, attributes and relations. As civilization advances, the mind begins to reflect more and more upon those objects, attributes and relations, and consequently finer distinctions and new relations are observed and new ideas spring up, which require to be dressed and fixed in language. If, in doing so, instead of inventing new expressions for the new ideas, old expressions conveying pretty much the same ideas with nice shades of difference, are suffered to embody the new ones also, ambiguity arises, and much confusion is created in the conducting of logical discourses.

It must be noticed, however, that words are not termed ambiguous simply because they can be severally applied to individual objects of the same species as in the case of general names. They must have different meanings *in connotation*. *Man* is not ambiguous because it can be applied to Milton, Byron, Burns, &c. *Cathedral* is not ambiguous because it

can be applied to St. Paul's Cathedral, St. Peter's Cathedral, &c. But the word *church* is ambiguous. It is applied to the building in which religious worship is carried on. It is used to denote the body of men collected together in such a place of worship. It also refers to the clergy as distinguished from the laymen. Such ambiguous terms are numerous and varied. Many of them are such as occur most frequently in our daily discourses and discussions, and as, for that very reason, escape our notice as frequently as they occur. The simple word *may* sometimes signifies power or absence of restraint, and at others, simple *probability*. In the example, 'with the funds thus liberated, he *may* now increase the pay of the subordinate officers,' *may* implies power; but in 'the Government *may* not sanction the proposed scheme,' *may* implies *probability*. Again, there is often a confusion of thought arising from the moral and physical significations of the word *cannot*. In the following argument—he cannot refuse alms to the poor; but one that cannot refrain from doing a good act, deserves no credit for it; and so, he deserves no credit for his good act—the first statement means 'he finds it *morally impossible* for him to do so; it is quite against his conscience to refuse them alms'; but, in the second statement, *cannot* is used in a *physical* sense. He that is circumstantially bound or physically compelled to do so, deserves no credit for his good act. To conclude from these two statements, and to say, 'he deserves no credit for his good act,' is an erroneous step to take, and, where the conclusion is actually

drawn, it is the result of the ambiguous use of 'cannot.' We shall take the word, *impossibility*. When we say 'it is impossible that 5 times 5 is 30, that any two angles of a triangle are together equal to two right angles,' we mean *mathematical impossibility*. When we speak of a certain act that 'it is impossible to be done,' we mean *physical impossibility*. It is physically impossible to build a castle in the air. That a thoroughly religious philanthropist should forsake his own community, and live the life of a vagabond, is a *moral impossibility*. To argue from an expression in which the word *impossible* is used in the *moral* sense as if it were used in the *physical*, or from one in which it is used in the *physical* sense as if it were used in the *moral*, is one of the commonest forms of fallacy. Similarly, instances of this nature may be endlessly multiplied, and a study of these may be advantageously pursued in Whately's Logic. Also, we are apt to confuse right with rite, sight with site, as also lead (conduct) with lead (metal). Though these are of minor importance, yet they require our special attention for the maintenance of strict logical accuracy in our discourse. Thus, from the above, the student will be able to see that there are three kinds of equivocal words, namely :

- (1) Those words that have the same spelling, but that have different pronunciations and different meanings. (Ambiguous in spelling alone.)
- (2) Those words that have the same pronunciation, but that have different spellings and different meanings. (Ambiguous in sound alone.)



(3) Those that have the same pronunciation and the same spelling, but that have different meanings. (Ambiguous both in spelling and sound.)

1. Instances of the ambiguity of the first order can be easily cited. Besides *lead* (n) and *lead* (v) which we have already mentioned, we may mention *august* (n) and *august* (a); *conduct* (n) and *conduct* (v) and in fact all those words which, by changes of accent, undergo changes of meaning.

2. Instances of the second order are also numerous. Steal and steel; reign, rein and rain; night and knight; hight and height; meet, meat and mete; brake and break; read and reed; strait and straight, &c., are in point.

These two classes of ambiguity must be said to arise from mere accident, and are not the sources of any serious error. The remedy of the ambiguity of the first order consists in the proper pronunciation of the word used, and the remedy of that of the second consists either in spelling out, or in writing down, the word in question.

3. As for the third class of ambiguity, it is by far the largest and the most confusing. It requires a careful and scrutinizing study. It arises from various causes:—

(a) Two roots, or even three, either from the same language or from different languages, allied in sound to some extent, but different in meaning, when taken into the English language, gradually undergo various transformations during the course of centuries, till, at last, by mere accident, they get confused with

each other and become one word. The Greek *paidos*, meaning a boy or a servant, and the Latin *pagere*, to fasten or to compose, have, ultimately, assumed the form *page* in the English language. The word *mean*, which is equivalent to low, base, or vulgar, comes from the A.S. root *gemæne*, which means 'that belonging to the *mæne* or many.' The same word signifying *mediocrity*, is derived from L. *medianum*, F. *moyen*. The same word, meaning to intend or to signify, comes from the A.S. *mænan*, to intend or to wish. Thus three different roots have developed themselves into the same word, meaning three different things. The word *bark*, as meaning the outermost covering of a tree, (from Ger. *borke*) is confused with *bark*, a small vessel (It. *barca*.) The same word also means the noise made by dogs (A.S. *beorcan*). The words rent, pound, fell, pulse, one, and gin which Jevons takes up for illustration, are also words in point. Curiously enough, this last word in the sense of a machine for lifting weights, &c., is a contraction of *engine*, and, as meaning a kind of liquor, is a contraction and corruption of *Geneva*. The accidental confusion of such *similar* words arises most often from the fact that they are among the *commonest* of words, and from that very circumstance least liable to be suspected.

(b) A word which connotes something, is made to connote some other thing which is always *associated* with it in thought. This is what Jevons calls '*transfer of meaning by the association of ideas.*' Habitual connection of two things leads to their in-

separable association in thought, and hence the name of one of them is made also to denote the other. *Church*, which we have already referred to, is a word of that kind. The word *paper* is made similarly to apply to so many allied objects. From L. *papyrus*, Gr. *papyros*, an Egyptian plant from which paper was first made, it was originally applied to a thin sheet of such substance intended to be written on. Since the use, then, was to write, it afterwards came to be applied to any *writing*, a *written document* or *essay*. By a similar process it was applied also to a *periodical* or *journal*. Next, it denoted all *documents of contract*, *currency notes*, *bills of exchange*, &c.

The word *college* from L. *collegium*, *colligere*, to collect, was originally a body of men devoted to some common pursuits, as a college of preceptors, a college of electors. It was afterwards specially applied also to a body of scholars devoted to the purposes of study. And hence it was extended to their whole establishment or building.

The word *school* (L. *schola*, leisure for learning) is a place where instruction is imparted. Hence it refers also to particular exercises of instruction, as in the question, 'Have you no school to-day?' Evidently by this transfer of a word to associated objects, it is applied also to a collection of scholars receiving instruction in a public school as in 'the school dispersed.' By the same process, it means the followers of a teaching as in 'He belongs to the school of Plato.' The word in English universities, also means the place where examinations for degrees are held.

The history of *note* is very amusing. From *L. notum*, to know, it originally meant a mark by which any thing is known. Since the use of that mark was simply to aid the memory, it was afterwards extended to any *memorandum*. Hence it was applied also to any comment written on the margin of a book for the purpose of assisting the memory. In the next stage, it meant any annotation on a book. It is now also used to denote a short letter of communication, a currency note, &c. In the last stage, it also means reputation as in the expression, 'He is a man of note.'

*Letter* (*L. littera*, fr. *litum*, to besmear, from the earliest method of writing by engraving upon waxed tablets) was merely the visible representative of a sound. Next it came to mean also a written note of communication. Since the letter, as distinguished from the sound, is merely a symbol signifying nothing, it was applied also to any literal statement, as in 'the letter of the law,' as distinguished from the spirit of it. In Printing, it means the types, and the transfer here is too evident to need any explanation. Note the meanings of the word in the phrases, 'letter of attorney,' 'letter of licence,' 'letter of marque,' 'letter of credit,' &c.

*Post* is a very interesting word. It is from *L. ponere*, to place. Hence it originally meant any solid pole firmly fixed on the ground as a support to something else. From the pillar so planted, it was transferred to the place where it is planted as in a military *post* (*military station*), a railway *post* (a station where refreshment is given to travellers), and the *posts* in

travelling (places where new horses are kept for transits to facilitate travelling). It was also applied to a messenger carrying news from one station to another. Hence it afterwards referred to the whole *postal system*. It was thence also transferred to the carriage by which mail was despatched.

These examples show how words may undergo modifications in meaning owing to necessities incident to the growth of a language. They mostly illustrate, however, transitive application grounded on contiguity; but many words undergo similar changes in meaning on the ground of similarity. Generalisation and specialisation of terms are examples. Salt is extended from sea salt to all saline bodies; oil from olive oil to all oils, animal, vegetable and mineral; parson from the incumbent of a parish to clergymen at large, &c. Something new has to be named, and it receives the name of that familiar object which it most nearly resembles. Again, specialisation takes place when people have to think and speak oftener of one member of a genus than of the others. Wit was originally great intellectual power of any kind; now it is restricted to such as can produce ludicrous effects.

(c) Another source of equivocation lies in the fact that, as regards the connotations of particular terms, science and common life differ and regard them in different lights. The scientific meaning of a term may be quite different from its popular meaning. People apply the word *heat* to any sufficiently perceptible degree of warmth. But scientific men recognise heat even in the so-called cold objects. This use



of terms has been spoken of by some as the *Civil* and the *Philosophical* use of terms. By the civil use of a term is meant its use such as will serve for the ordinary purposes of civil life ; while its philosophical use is its use which serves to signify some definite scientific notion. Instead of allowing the word *heat* to express the popular notion and inventing a new word for themselves, the scientists have thought that the old word would serve their purpose as well, and retained it. They have done so apparently on the principle that technical words ought not to be increased, because they would be useless burden to the memory. The ordinary acceptation of *fish* is distinct from its acceptation in natural history. The latter includes under it not only true fishes but also shell-fish or mollusca, the cetacea, and in fact all swimming animals. It may also be noted that, in some cases, names were usurped from common speech, and were appropriated entirely to certain technical uses. The word 'sphere' which originally meant 'a playing ball,' and the word 'trapezium' which originally meant 'a table,' have been appropriated by geometers, and they no longer suggest what they originally meant.

(d) Ambiguity often arises from a confusion of the literal and metaphorical significations of a word. A word which denotes one thing, is by *analogy* or resemblance, transferred to another. We would be committing the fallacy of equivocation if we were to argue from an expression in the literal sense as if it were used in a metaphorical and *vice versa*. The literal meaning of *delicate* is 'affording pleasure to the



senses.' Now note the various metaphorical senses of the word in the phrases, *delicate* countenance — *delicate* cotton — *delicate* silk — *delicate* red — *delicate* constitution — *delicate* manners — *delicate* topic — *delicate* musical ear. Delicate also means voluptuous. Again, 'John is a bright fellow in the class' metaphorically means he is ahead of his companions in all the subjects. It is by analogy that we speak of a *brilliant* exploit, a *brilliant* style, or a *sore* calamity. In fact, the existing terminology of mind is made up mostly of names which were, in the first instance, material. Though some of these names such as recollection, intuition, discrimination, relativity, &c., have parted with their material significations and suggest only their subjective meanings, yet there is a large number of them retaining yet their material significations. Such are—*move*, *trembling*, *sore*, *agitation*, *commotion*, *shock*, *tension*, *association*, &c.

3. Ambiguity : Its remedies.—To acquire a thorough familiarity with the ambiguities existing in the most frequently occurring words and expressions, *i.e.*, to gain a complete knowledge of the subtle distinctions in meaning which words in frequent use in logical reasonings may embody ; to be familiar with the literal and metaphorical, scientific and unscientific meanings of terms ; to reckon those equivocal terms possessing a number of connotations as so many different words ; to understand well the sense in the context in which a certain word may be used at a particular time ; and a few other precautions of a similar nature, which will suggest themselves to the

students, are all the remedies for the avoidance of the snares due to the ambiguity of terms. Very frequently a word is so placed and fenced in the context as to keep back all the meanings not intended. But, when it is not clear from the context what meaning is intended, what are the various other means by which it can be precisely ascertained ?

(1) The Definition of the word so indeterminately used may be ascertained. Definition is the specific for ambiguity, and is the surest means of avoiding error from that source. There are other ways, however, sufficient for all practical purposes, by which the exact meaning of a word in a context may be known.

(2) If the ambiguous word in question be a concrete word, then ascertain its corresponding abstract term, if it has one. Thus if *man* be used in the sense of "a created being possessing the attributes, rationality, corporeity, &c., then this is determined by its corresponding abstract term *humanity*.

(3) If it be a relative term, ascertain its correlative. *Master* in the sense of an *employer* is rendered precise by the mention of its correlative *servant*.

(4) A surer method is that of ascertaining the *negative* or the opposite of the term, either by a word or a descriptive phrase. *Certain* in the sense of *sure*, is determined by its negative *uncertain*. When the opposite of the term 'reason' is stated to be 'passion,' we at once understand it in the sense of 'motives resulting from rational calculation of the future.' The word *old* has so many meanings, and it is

severally opposed to young, new, and modern. The meaning of *old* in the phrase '*old days*,' is known by the mention of its opposite *modern*. This device of ascertaining the contrary has been found to be very effectual in removing ambiguity.

(5) Ascertain the higher genus which the speaker has in his mind. Supposing the word *orange* is used, if the higher universe is stated to be *fruits*, then understand it in that connection; if it is stated to be colour, then understand that orange colour is meant. With regard to the ambiguous term, *civil*, Dr. Bain says, "if the universe be the condition of human beings in relation to one another, '*civil*' means organised into human society; if the universe be the departments of government, '*civil*' is known to exclude military and ecclesiastical; if the universe be manners or address, *civil* is understood in that connection."

---

## CHAPTER IV.

### CONCEPTS: THEIR CHARACTER AND FORMATION— THEIR PERFECTION AND IMPERFECTION— GRADES OF GENERALITY;

1. Formation of Concepts.—A general notion or a concept (L. *con*, together, and *capere*, to take) is the seizing together by the mind, of the attribute or attributes common to two or more objects. From a number of white objects, such as paper, lime, moon, cloth we abstract (L. *abs*, from, and *trahere*, to draw) the common property of whiteness, and give them the general name of '*white things*.' Thus, the mental

processes that take place are *comparison*, *abstraction* and *generalization*. Thomson breaks up *comparison* into two distinct processes, namely, *comparison* and *reflection*. We compare two or more objects to see how far they resemble, reflect upon them to ascertain the points of resemblance and the points of difference, abstract the common properties, and then generalize. But comparison does not mean simply bringing things together. It also means recognising the points of similarity and difference. And so, reflection is unnecessary. *Abstraction* is the separation of the points of agreement from the points of difference and making them the objects of our exclusive attention. Some also say that we abstract the points of difference from the points of agreement and not the reverse. Others, again, hold that it is the mind that is abstracted by the points of agreement, and not either the points of agreement or the points of difference. Whichever view is taken, the points of agreement alone finally remain in the consciousness. *Generalization* is that mental operation by which we pass from individual predication to the predication of a plurality or class. There is also another process called '*Denomination*,' by which we give a name to the result of abstraction and generalization. The whole process is sometimes spoken of as *Generalization*, sometimes as *Classification*, and sometimes also as *Abstraction*. Such a process is necessary, because the finite mind has to comprehend the infinite number of objects of the creation. These objects which are not infinite in variety, can be classified into different

groups and can be thus easily grasped and remembered.

A general notion, as can be seen from the above, implies two things ; a plurality of objects, and a common attribute or attributes. It can be defined from either point of view. We may either say that a concept is the notion we have of a plurality of objects possessing a common attribute or attributes, or that it is our notion of a common attribute or attributes inhering in a plurality of objects. In the former case, the prominent fact in our mind is the denotation, while in the latter case it is the connotation. Our concept of '*whiteness*,' then, is the abstraction. In the concrete, '*white things*,' it is called the class. The notions of heat, cold, roundness, softness, roughness, &c., are obtained in the same way. The corresponding classes are '*hot things*,' '*cold things*,' '*round things*,' '*soft things*' and '*rough things*.'

Now, in the above instances, the things selected for comparison, exhibit only one property in common, and hence the notions may be called *Single-propertyed* notions. Such notions are in direct contrast to propositions which are either affirmations or denials of at least two notions. But then, a notion may also be a *Many-propertyed* notion. The things for comparison may also exhibit numerous properties of a varied character. The notion of a *writing table* is double-propertyed. It is (1) a wooden article (2) used for writing. The notion of church is likewise double-propertyed. It is (1) an artificial erection (2) used for religious worship. It is difficult to enumerate the properties of *man*. Thus, we may find instances of notions which contain many properties. Now, between a single-propertyed notion and a proposition, the difference is un-



mistakable. In the latter, there are two notions implicated, whereas in the former, there is only one. The difference, however, between a many-propertyed notion and a proposition, appears to vanish as in both there may be many properties. But this difficulty disappears when we remember that in a many-propertyed notion, the conjunction of properties or attributes is admitted by all, while in a proposition it is merely asserted, and may require to be proved. No body has ever questioned the conjunction of so many properties in *man*. The very designation implies all the human attributes. No one requires any proof for it. It is a matter of tacit assumption. But in a proposition, the case is different. The conjunction of the properties is asserted, not assumed. It is open to doubt and may require proof. 'This table is a heavy body' is an affirmative proposition consisting of two notions, 'this table' and 'heavy body.' One of them is affirmed of the other and this affirmation may require to be supported by evidence. It must be observed, however, that there is no possibility of confusion between a many-propertyed notion and a negative proposition, because in the latter the incompatibility of properties is asserted, and not their conjunct existence.

2. The character of Concepts.—It was once held by a certain class of thinkers, deriving from Plato, that the aggregate of common qualities signified by a general name existed in nature apart from the objects themselves. The essential attributes of 'horse,' for example, were held by them to possess an objective existence, and to constitute a universal or a typical horse which was no horse in particular, but in which every individual horse participated, and which alone had real and independent existence, while



the particular horses were merely its shadows and depended upon it for their existence. There were similar archetypal forms for 'man,' 'dog,' 'just,' 'good' and in fact for every general notion or concept. This doctrine which is called *Realism*, has now become obsolete.

According to another school of thought, it is possible for the mind to represent to itself the common attributes alone as entirely separated from the differential marks. This is called *Conceptualism*. The concept is an intelligible, not a sensible, synthesis of the common attributes. When we think of 'horse,' no particular horse comes up before our mind, but the essential attributes of 'horse' are represented in the mind as an intelligible aggregate apart from any reference to the specific attributes of particular horses. No image of any kind, particular or generic, is present to the mind on the occasion. Thought can be carried on without the help of any such image. Dr. Ward and Mr. Stout are the modern advocates of this view. It may well be doubted whether the mind has this power of giving a preference of attention to some attributes of an object *to the entire exclusion of the rest*. It may think much of 'roundness,' and less of size and colour; but it is not possible for it not to think of size and colour at all when it thinks of 'roundness.'

There is yet a third view regarding the character of general knowledge, according to which a concept is nothing more than the fact of agreement existing among a number of things, designated by a general

name. The community of attributes does not exist in nature independently of the things, nor can it be thought of by the mind to the total exclusion of the differential marks. It exists in the things themselves, and can at best be represented most vividly in consciousness through a concrete image or images, the differential marks being also present there though vaguely. This is called *Nominalism*, and Berkeley, Mill, and Dr. Bain may be mentioned as its chief representatives. Dr. Bain says that in thinking an abstraction the mind takes a rapid survey of the various objects of the class, the effect of the survey being that the common qualities start into great prominence while the particular features fall into the background without being entirely extinguished. We often use single individuals to typify a whole class; as in the diagrams of Euclid. But here, we confine our attention to the common features in the individual and affirm nothing regarding the specific marks, though these can never be entirely divorced from the former. Mill says that we have always a concrete image, and we specially attend to the generic attributes in that image with the help of the general name which signifies them. Even when this attention is very intense, there is an awareness that the attributes forming the subject of such attention, are only a part of the concrete representation.

3. *Perfection and Imperfection of Concepts.*—Our general concepts are often imperfect in more ways than one. They are often hazy and indistinct. The common characters of the objects thought

about are not distinctly represented in thought. Children and even some grown-up men cannot define exactly the essential features of metal, planet, &c. Again, concepts are not merely indistinct in the sense that the essential features are not clearly represented in thought, but they are also indistinct in the sense that kindred but partially dissimilar concepts are often confounded. Men often betray ignorance of the distinction between wise and learned, planet and fixed star, metal and mineral, &c. One test of the distinctness of a concept is the readiness to identify an object as belonging to such and such class. But this is not always a sure test. It is possible to distinguish an object, as a child distinguishes a fruit, without being able to say what the essential qualities are of that class of objects.

The indistinctness of a concept may be due to the indistinctness of the particular percepts originally compared to obtain the concept. It may also be due to incompleteness in the process of comparison so as to bring into relief the points of resemblance. The points which distinguish one class from a kindred class, may not also have been carefully noted. Sometimes also, from mere lapse of time, owing to the absence of a need for a distinct use of a concept, this last may become hazy. Language also promotes indistinctness. The ambiguities of words and the careless use of expressions by elders leave indistinct notions in the minds of children, which, if left uncorrected, tend to show themselves even in adult years.

Besides being indistinct, concepts are also some-

times inaccurate. A concept may become inaccurate, either through the omission of one or more of the essential attributes thus rendering the corresponding class too wide, or through the inclusion of some of the non-essential attributes into the essence thus rendering the class too narrow. Inaccuracy of concepts may also be due to the same causes as their indistinctness. The analytical process of formation may have been incomplete, resulting in essential omissions, or non-essential additions. Or, from mere lapse of time, some essential elements may drop out of view, while some non-essential elements may insensibly creep into the essence. In fact, when concepts are indistinct, they tend to become inaccurate.

Perfect knowledge, according to Leibnitz, consists in its being *clear, distinct, adequate, and intuitive*. Our knowledge of a thing is said to be 'clear' (as opposed to 'obscure') when we can distinguish it from other things. It is said to be 'distinct' (as opposed to 'confused') when we can discriminate the various elements composing it. A botanist knows the qualities of a rose, and has a clear and distinct notion of it. A chemist can recognise phosphorus and knows its properties well, and hence has a clear and distinct notion of it. A clear notion may not be distinct. We may recognise a face, but we may not be able to say by what marks we do so. But distinctness always presupposes clearness. Clearness and distinctness thus correspond to the two kinds of distinctness already defined. Again, our knowledge of a thing is said to be 'adequate' (as opposed to 'inadequate') when we can not only analyse the parts of the thing, but can also analyse the parts of these parts, and so on. Since carrying the analysis *ad infinitum* is not possible, that knowledge is usually considered adequate which is arrived at by an analysis of it so far as would be deemed absolutely necessary for the purpose in hand. The mechanist's knowledge of his

machine is adequate. He knows its most elementary parts and knows also the materials, uses, and the modes of action of each. 'Intuitive' knowledge of a thing is our realising its attributes immediately in consciousness. Our knowledge of a straight line, a circle, or a square, is intuitive. But when a notion happens to be highly complex, *i.e.*, when its attributes are so numerous that we cannot represent them in thought, we use a symbol to designate the object, and our knowledge of the object is only symbolical. Our algebraical notions are all symbolical.

4. Grades of Generality.—We observed that the process of generalization had various phases and that abstraction was one of them. The process of abstraction once performed, gives rise to a notion or concept, and the things possessing the common property or properties so abstracted, and acquiring a general name, form a class. Such a class, we know, embraces a definite number of things. If, along with these things, other things are compared, and another abstraction performed, we get at another notion, and the new class, now wider in extent, is characterised only by fewer attributes. If, again, with this class of things, we compare others, and perform another abstraction, we get at another notion, and the new class again becomes still wider in extent with still fewer characteristic attributes. Thus we may obtain a number of classes rising in generality. One class is said to be more general than another when the individuals falling under it are greater in number, when the extent is wider. *Man* is a class. The class *mammalia* is more general than *man*. The class *animal* is more general than *mammalia*. The class *organized being* is again more general than *animal*.

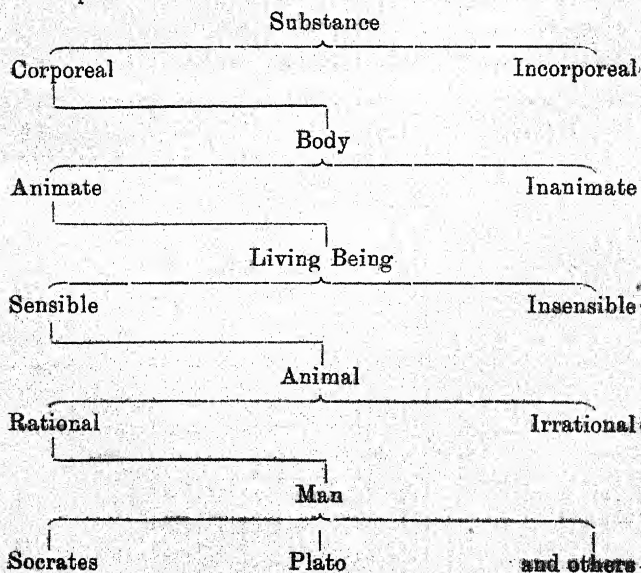
Similarly *metal* is more general than *gold*, and *element* is more general than *metal*. Thus we have a system of grades of generality. The class more general is called the *Genus* (L. *genere*—to engender), and the class less general is called the *Species*. The class *animal* is the genus with reference to the species *mammalia*. The same class is the species with reference to the genus 'Organized Being.' The distinction of genus and species is thus only relative. The terms are not fixed as in Natural History to certain grades, but are purely relative to one another, and movable up and down a scale of generality. If a class is such that a more general one cannot be found, then it is called the *Summum Genus*,\* the highest genus or *genus generalissimum*, the most general genus, i.e., the widest class containing the largest number of objects and marked by the fewest attributes. If it is such that a less general one cannot be found except the composing

---

\* *Ten summa genera*, called *Categories* or *Predicaments*, were recognised by the Aristotelian Logicians, and the series starting from each summum genus and leading down to an infima species through grades of descending generality, was called by them a *Predicamental Line* (*Linea Predicamentalis*). As each genus will have at least two species under it, each Predicament will have as many predicamental lines as there are *infima species*. The ten *summa genera* have not been accepted by Logicians, and while some recognise six, and some five, others doubt whether there can be any true summum genus except Being, or Substance. But, for practical convenience, the term is employed to denote the most general class comprising the subject-matter of any particular science. 'Mind' is the summum genus of Psychology, 'Material Substance' of Chemistry, 'Man' of Sociology, 'Animal' of Zoology, 'Plants' of Botany, &c. Thus, it is possible that a mere species in one science is the summum genus in another.



individuals, then it is called the *Infima Species*, the lowest species. The intermediate classes between the Summum Genus and the Infima Species are called the *Subaltern Genera* (L. *subalterna*, *sub*—under, and *alterna*—the other of two, inasmuch as one species stands under the other). The genus next above a particular species is called the *Proximum Genus*, and the species having the same proximate genus, are called the *Co-ordinate or Cognate Species*. In the *Tree of Porphyry*, which we here insert, *Substance* is the summum genus, and *Man* is the infima species. Body, Living Being and Animal are the subaltern genera and species, because each is both a genus and species at the same time. Since the individual



Socrates, falling under the class *man*, is included in each of the subaltern genera and the summum genus, *i.e.*, since the names of the subaltern genera and the summum genus can be predicated of Socrates, the whole system is called a system of cognate genera. We can say 'Socrates is a man,' 'Socrates is an animal,' 'Socrates is a living being,' 'Socrates is a body' as also 'Socrates is a substance.' In the same Tree of Porphyry, we find that each genus is subdivided into two species and these are called *Co-ordinate* or *Cognate species*. *Rational* and *Irrational* are co-ordinate species under the class *animal*. The names connote some attributes and can be predicated severally of the individuals composing the classes. *Triangle* is a species in the genus *rectilineal figure*, which is itself a species in the genus *figure*. *Animal* is also a species in the genus *organized being*. *Arithmetic* is a species in the genus *mathematics*, which is itself a species in the genus *science*.

In intension, as we have already observed, a class means the aggregate of attributes characterizing it, or marking it out from other classes. The class 'man' is constituted by a certain number of attributes. The class 'animal' which is the genus above the species 'man' contains a greater number of individuals, but is marked by fewer attributes. 'Organized being,' which is the genus above 'animal,' is still wider in extent, but has still fewer characteristic features. So that, as the classes rise higher in generality, embrace wider spheres, their characteristic attributes diminish in number.

## CHAPTER V.

THE PREDICABLES—VERBAL AND  
REAL PREDICATION.

I. Definition of 'Predicables.'—The word Predicate is from the Latin *prædicatum*, to proclaim, and hence denotes that which is *actually* asserted or denied of a subject. In the proposition, 'John is a man' which expresses an affirmation, *man* is the *predicate* affirmed of John. In 'Robert is not wise,' which expresses a negation, *wisdom* is the *predicate* denied of Robert. But a Predicable is what *can* be affirmed or denied of a subject. It indicates the relation which a predicate bears to its subject. In all propositions, the predicate bears a certain kind of relation to the subject. All such particular relations may be found to come under a few general heads, and the general relations of attributes are expressed by what are called the 'Predicables.' They are *Genus*, *Species*, *Differentia*, *Proprium*, and *Accidens* or *Concomitant*. This is not a logical division, as the first two refer to classes, and the next three refer to attributes. They must be distinguished from *Predicaments* or *Categories* which are, not the classes of relations subsisting between predicates and subjects in logical propositions, but the *real attributes* themselves reduced to the fewest heads, the highest classes, the names denoting which can possibly be predicated of an existing object. The origin of the term 'Predicables' is curious. Minto tells us that Porphyry explains the five words merely as terms which it is useful for us to

know chiefly in connection with Definition and Division; but that he incidentally draws a distinction between Singular terms, such as, 'this man,' 'Socrates,' which can be predicated only of single individuals, and not of many, and the names of Genera, Species, &c., which can be predicated of many individuals. When a name was wanted for all the five taken together, the name designating this special feature was seized, and they were termed the Predicables. The original meaning is now forgotten, and the term Predicable now indicates the relation of predicate to subject in a logical proposition.

(a) Genus and Species.

Of *Genus* and *Species*, we have said enough. In the popular sense, any class which contains the whole of another and more is a Genus, and the other is a Species under it. The different kinds of taste are the species under the genus 'taste.' The different virtues, namely, prudence, veracity, forbearance, generosity, justice, &c., are different species under the genus 'virtue.' The Aristotelian logicians, however, used the terms Genus and Species in a more restricted sense. With them, every class was not a genus, nor every class a species. It could be found on examination that those classes alone were considered by them as *genera* and *species* which differed from one another in an infinite number of known and unknown properties. J. S. Mill shows that what they meant by *essential* difference amounts only to a difference of this kind. He says of their use of those terms:—

"Every class, which is a *real kind*, i.e., which is distinguished from all other classes by an indeterminate multitude of properties, not derivable from one another is either a genus or a species." All classes are not *kinds*. Frenchman, christian, heathen, philosopher, and politician are classes under man, but they are not species; for politician, for instance, differs from man only in slight particulars. The name connotes, besides the qualities of man, the attribute of 'skill in Politics' and such others as are dependent on it. This difference does not at all constitute the difference between two kinds. There must be, according to them, a number of essential attributes not derivable from one another to distinguish a kind. All the attributes common to man and politician forming no part of our inquiry, the question is, whether, besides the specific attribute of 'skill in Politics,' we seriously think of inquiring whether there are, unconnected with 'skill in Politics,' any attributes common to all politicians and peculiar to them. It is evident we do not. But in the case of all men, such an inquiry is being perpetually carried on by physiologists, and the answer is never likely to be completed. Hence, politician is not a kind, but simply a class. Mill adopts the same view, and it is on this distinction that the next three predicables are also based.

Animal is a genus with reference to man, and a species with reference to organized being. 'All men are animals' and 'all animals are organized beings' express the relation of genus and species between the predicate and the subject. In 'Socrates is a man,'



the predicate expresses a species, and the subject is an individual under it.

(b) *Differentia*.

Again, a species is always marked by a greater number of attributes than the related genus. Its essential attributes are the essential attributes of the genus *plus* the attribute or group of attributes whereby it is distinguished from other species of the same genus. This distinguishing attribute, or group of attributes, of the species, is called its *Differentia*. It is included in the connotation of the specific name, but not included in the connotation of the generic name. Whatever differentiates 'metal' from the rest of the elements is the *differentia* of 'metal.' Mathematics being the species in the genus, science, what is connoted by the term, mathematics, over and above what is connoted by the term, science, is the *differentia* of mathematics. 'Poetry' is a species of Fine Art, its *differentia* being the use of metrical language as its instrument. The square is a species under four-sided figure, and it has some essential attributes marking it off from other species. 'Rectangular' is one of those attributes and we may predicate 'rectangular' of a square, as 'a square is rectangular.' This proposition, to remark incidentally, does not affirm any new truth, but states only what is already known. It expresses in so many words what is implied in the word square.

Genus, species, and difference are mutually related to one another. From any two of them, we can infer the third. From the genus and the species, we can find out the difference. We have only to subtract the



essential attributes of the genus from the essential attributes of the species. If we add the difference to the generic marks, we get the essential characters of the species. If we subtract the difference from the attributes of the species, we get the attributes of the genus.

1. The species — the genus = The differentia.
2. The genus + the differentia = The species.
3. The species — the differentia = The genus.

This puts us in mind of one of the modes of definition which consists in merely stating the genus and the differentia. Thus, a square is a four-sided figure (genus) with all its sides equal, and all its angles right angles (difference). A house is a building (genus) used for habitation (difference). Man is an animal (genus) possessing corporeity, &c. (difference). This mode of definition, though a practically useful mode, is yet not scientific, as it presupposes in the reader a knowledge of the genus to which the species is referred. If the genus and the difference are known, then the species is known also. This definition states the genus and the difference. We know the difference, but we do not know the genus. One must know what 'Science' is before one can understand what 'Biology' is with the help of this definition. Similarly, the characteristics of 'Fine Art' ought to be known before an adequate notion of 'Poetry' can be obtained with the help of this definition.

Differentiæ are Specific or Generic. A specific differentia is what distinguishes the cognate species from each other, while a generic differentia is what belongs to all the cognate species and to these species alone, forming part of the connotation of the corresponding generic name.

A generic differentia of a species is the specific differentia of the next higher genus in relation to the yet higher genus.

Now, it is necessary to observe that the affirmation of the attributes *implied* in the three predicables—genus, species and differentia—about those classes themselves, is no real affirmation at all but a verbal one. To say that a particular man is not human involves an inconsistency. Without it a particular being will not be called man. Hence, the predication of these attributes is verbal, (L. *verbum*, word) as opposed to real, predication, *i.e.*, such a predication about the classes does not convey to us any new information, but is simply a statement of what we already know.

(c) Proprium.

*Property* (L. *proprium*, with its Greek equivalent = own) is a quality which can be deduced immediately from one or more essential attributes, or which can be traced, or is referable, to them. That which marks out a triangle from other species under a plane figure, is its possession of three sides. This is its essential character, but its three angles being together equal to two right angles, is its *proprium*. That the square on the hypotenuse of a right-angled triangle is equal to the sum of the squares on the two sides, is the property of a right angled triangle. That liquids find their level, is a *proprium*, since it can be derived from the essential attributes of liquids. There are two ways in which one attribute may follow from another, *viz.*, either as a conclusion from premises, or as an effect from a cause. 'Having the opposite sides equal' is a property of a parallelogram, and is a property of the first kind

since it follows by *demonstration* from the essential attributes of having the opposite sides straight lines and parallel, and the number of sides four. The 'power of speech' which man possesses is a property of the second description since it flows directly from a particular laryngeal structure and rationality as an effect flows from a cause. In either way, the proprium follows from the essence *necessarily*. Logicians have distinguished various kinds of properties according to the extent or sphere of objects to which they belong.

1. A property may be *peculiar* to the species, and may belong to each and every individual of the species without being universal. The property of liquids above mentioned belongs to liquids alone and to no other species. Similarly the property of triangles above instanced belongs to triangles alone. The power of laughing is peculiar to man. The *power of cooking food* is peculiar to him and can be deduced from his anatomical structure. This is what we usually understand by proprium, which is defined as *an attribute possessed by all the members of a class, found in that class only, and flowing from the essential attributes without being included in them*. In Mathematics we find propria satisfying all these three conditions.

2. A property, however, may not be peculiar to a species, and may belong to other species besides, for, it may flow from that part of its essence which is also a part of the essence of some other species. The property of *swimming* belongs to man and to other species. *Educability* is not a property peculiar to man. When a property belongs to all the species of a genus, being deducible

from one or more of the essential attributes of the genus, it is called a *Generic Proprium*; and when it is found in the whole of the species only, being deducible from its differentia, it is called a *Specific Proprium*.

3. A property may be peculiar to the species, but may or may not belong to each and every individual of it. The property of being a statesman or a philosopher which can be deduced from the essential characters of man, is peculiar to man, but does not belong to each and every individual composing the species. Every man is not a statesman or a philosopher. But this is more an accident or concomitant than a proprium.

The student will now be able to see that, in predicating a proprium of a subject, we are, in fact, affirming of it, something real or substantial, conveying to our hearers a new information. Thus all the propositions which are inferences by mathematical reasoning, are real propositions.

(d) *Accidens*.

*Accident or Concomitant* is an attribute or quality which neither belongs to the essence of the species of which it is predicated, nor is deducible from any part of it, but a quality which comes by the way, which may or may not belong to all the individuals of the species, and the removal of which does not affect the fundamental nature of the species. It has no connection whatever with the essential attributes. The etymology of the word itself (L. *ad*, and *cadere*, to fall, hence, falling by chance) clearly shows its nature. *Accidentia* are either of a species or of an individual, and in both cases they may be either Separable or

Inseparable. Separable Accidents of a species are such as do not belong to all the individuals of the species, or if they do, not at all times. That tigers are largely found in Bengal, is a separable accident of the class of tigers. Learning is a separable accident of man. Inseparable Accidents belong to all the individuals of a species. They are universal in the species, but not necessary to it. An inseparable accident is not easily distinguished from a proprium except by the fact that the latter is deducible from one or more of the essential attributes, while the former is not. It is not in fact easily distinguished even from an essential attribute. But we know that an essential attribute is one without which the species would be no species, while the removal of the Inseparable Accident would not affect the species in any way. Again, an attribute which generally varies when all other things remain the same, though it may belong to the whole species, is yet an inseparable accident. It is the variable character of the attribute, as judged from other cases, that makes it an accident. The colour of animals is an attribute of that kind; and where the same colour belongs universally to a species, it is an inseparable accident of that species. The blackness of the crow is an example. Blackness does not form part of the connotation of 'crow' inasmuch as we would not hesitate to give the name 'crow' to any new bird that may be discovered to be *white*, but that may yet possess the essential characteristics of a crow. An *Inseparable Accident* of an individual is illustrated by the place and date of his birth, while a Separable Accident is



exemplified by the dress he may be wearing at a particular time, his posture, his actions, his profession, &c. It may be remarked that to predicate an accident, of a subject, is to say something pre-eminently real about it.

2. **Verbal and Real Predication.**—Predication, as we have seen, may be either Verbal or Real. Verbal predication consists in affirming of a subject, an attribute or attributes implied in the meaning of the subject itself. It is a proposition in which the connotation of the predicate is a part, or the whole, of the connotation of the subject. To affirm of any species one or more of the attributes entering into its essence, is to affirm nothing new. The fact of the species possessing those attributes is already announced to us by the very name of the species. Such a predication is an exposition in language of the meaning of a concept. It is also called an Essential, Analytic, or Explicative predication. As we have seen, the three predicables—*genus*, *species*, and *differentia*—relate to this kind of affirmation. When the name of a *genus* or a *differentia* is predicated of a *species*, the proposition is verbal. The name of a species is predicated only of an individual. Opposed to this predication, is the Real, otherwise called Synthetic, Non-essential or Accidental, or Ampliative predication. It is the predicating of a species some fact not involved in the connotation of the name by which the species is denoted in the proposition. The other predicables, *Proprium* and *Accident* relate to this predication. If a property deducible from an



essential attribute be predicated of a subject, then, it is not a verbal affirmation that is made, but a real one. Also, by affirming of a subject an accident, we convey new information to our hearers. A Verbal predication is called an Analytic predication as it *analyses* the meaning of the subject, Explicative, as it *unfolds* the meaning, and Essential, as it expounds a part or whole of the *essence*. It is also called an *Identical* proposition, as a part or whole of the connotation of the subject is *identical* with that of the predicate. Similarly, a Real predication is Synthetic, as it relates to a conjunction or *synthesis* of two distinct sets of attributes, Ampliative, as it *amplifies*, or adds to, what is implied by the subject, hence our knowledge of it, and Accidental, as it is a predication of an *accident* in the wider sense of the term including *proprium*, the sense in which the accidents of a thing are opposed to its essence. A Verbal predication deals with the relation between a name and a thing, whereas a real predication deals with the relation between two things.

'A triangle is a three-sided figure' and 'a square is a four-sided figure' are verbal propositions, because the possession of 3 sides and that of 4 sides are the characteristic features of a triangle and a square respectively.

'Honesty is the best policy' is a real affirmation.

'Matter is the extended' and 'mind is the unextended' are verbal propositions, because extension and non-extension are respectively the essential properties of matter and mind.

'A lake is a vast expanse of water' is verbal, 'vast expanse of water' being implied in the notion of a lake.

'Conscience is a safe guide in all our actions' is real, because *that* fact is no part of the meaning of the word. But,

'Conscience exercises authority over men's actions' is verbal, because authority is an element in the growth of Conscience.

'Milton wrote the *Paradise Lost*' and 'Homer wrote the *Iliad*' are real propositions. Dr. Bain, however, seems to think that the latter is verbal on the ground that we do not know anything of Homer except his authorship of the *Iliad*. But, the moment we pronounce the name 'Homer,' we attribute individuality to him and suppose that a person with that name must have actually existed and must have been the author of many actions. He might not have been the author of any other piece of composition, and yet, it is an information to us that he wrote the *Iliad*. Further, we know, as a matter of fact, that the authorship of the *Iliad* is a contested point, and is sometimes denied of *Homer* and ascribed to other authors.

Here it must be noted that proper names not being connotative, propositions with proper names as subjects are real or synthetic propositions. But when the subject is a significant singular name, the proposition is analytic, when the connotation of the name includes the essential attributes of the species implied by the predicate, *e.g.*, 'the present Viceroy of India is a man'; and synthetic, when it does not contain them, *e.g.*, 'the present Viceroy of India is a Liberal.'

Owing to the fact that the definitions of Real and Verbal propositions given here do not include cases like 'Tully is Cicero,' where the subject and predicate are both proper names, and also cases like 'wealth is riches,' 'a story is a tale,' where they are dictionary synonyms, Dr. Keynes defines a *real proposition* as "one which gives information of something more than the meaning or application of names," and a *verbal proposition* as "one which states only what is implied in the

meaning of the terms involved, or which gives information only with regard to the application of names." It will be seen that this definition of verbal propositions includes the two cases specified above, which he designates as *synonymous* propositions, and that in this sense of *real* and *verbal*, the other pairs of terms cannot be regarded as its exact equivalents. The most important class of verbal propositions is constituted by *Definitions*, which are complete analyses of the connotations of names.

Dr. Keynes places in a distinct class, propositions which may be discerned to be true from their bare form whatever may be the meaning of the terms involved; and calls them for that reason purely *formal* propositions; e.g., *All A is A, No A is not-A, All A is either B or not-B, If all A is B then no not-B is A, If all A is B and all B is C then all A is C.*

Some writers identify connotation with *subjective intension* and declare that synthetic judgments are only analytic judgments in the making. Dr. Bain draws a scientific distinction between *Essence* and *Property*, including under the former all those common attributes which are ultimate and not resolvable into one another, and under the latter only such as can be traced to another attribute or attributes. According to him, if an ultimate property belonging to all the members of a class be newly discovered, then the affirmation of that property would be verbal. In this way propositions which really assert facts are regarded by him as verbal. The distinction between *real* and *verbal* is thus practically abolished. He mentions, however, three circumstances under which really verbal propositions would be real. In the case of a newly discovered ultimate property, he says the affirmation would be real on

its first announcement, though after the property is well understood and impressed in the memory it would become verbal. Secondly, there are cases in which, though the affirmation about an object, of any one of the essential attributes, may be simply a verbal affirmation, yet the conjunction of those attributes in the object in question may require to be proved by a critical observation of a large number of particular instances, by inductive inquiry. In such cases, an assertion of such a conjunction would be a real assertion. An assertion of the conjunction of all the properties of chemical affinity is real. Thirdly, it may be that an essential attribute is brought into prominence by an assertion which, on that account, becomes real.

3. Definition.—Definitions are the most useful class of Essential propositions. To define a name is to explain its intention or meaning, or to *analyse* it. A complete definition of a name would be an exhaustive enumeration of all the essential attributes connoted by the name. As the separate statement of each of the essential attributes is an analytic predication, a complete definition is a summing up in one statement of all the analytic predications that can be made of the name defined.\* This is definition (literally, laying

---

\* We have referred to the difference between J. S. Mill and Dr. Bain on this point. While agreeing in the view that Definition is the analysis of the connotation of a name, they differ as regards what attributes should be accounted as entering into such a connotation. Dr. Bain would include in it any new attribute that may be discovered to belong to all the members of the class denoted by the name, provided it is ultimate. "When we are told that diamond, which we knew to be a transparent, glittering, hard, and high-priced substance, is composed of carbon, and is combustible, we must put these additional properties on the same level as the rest; to us they are henceforth connoted by the name." (i. 73). Nothing less than a complete enumeration of all the ultimate properties,

down a boundary) legitimately so called. A partial enumeration of the attributes would be an imperfect definition.

*Proper* names being non-connotative cannot be defined except by means of inseparable accidents which simply *describe* who the particular men or things are ; e.g., John Knox is the son of General Knox. Such statements are descriptions, instead of definitions. The names of the simple sensations themselves, such as, *sensation of white*, cannot be defined. We can only appeal in such cases to the personal experience of the individual whom we address. *Simple abstract* names such as are the names of attributes grounded on a variety of external effects, such as, *persuasiveness*, can be defined only by analysing those external effects themselves. Persuasiveness is the power of influencing the feelings of others so as to make them accept our own views. But the abstract names of a complex character can be defined by enumerating the

---

would according to him be a complete Definition. Mill says that this view of Definition tends to confuse the important distinction between *real* and *verbal* propositions, the purpose of which is to discriminate propositions which convey information from those which do not. He thinks that we ought not to include in the meaning of a word those properties which can be known only by special scientific study, and ought not to say that because a few persons know a particular property the affirmation of it should be regarded as verbal. "I hold that (special scientific connotation apart) a name means, or connotes, only the properties which it is a mark of in the general mind ; and that in the case of any additional properties, however uniformly found to accompany these, it remains possible that a thing which did not possess the properties might still be thought entitled to the name." Ruminant does not *mean* cloven-hoofed, nor is equiangularity included in the definition of equilateral triangle, though in both the cases the properties are independent of each other and are always foundtogether.



names of the constituent simple notions. *Animality* can be defined by enumerating the attributes entering into it. *Humanity* comprises rationality, corporeity, &c. Significant singular names can also be defined by mentioning the connotation of the class-names which they contain together with that of the other names used for specification.

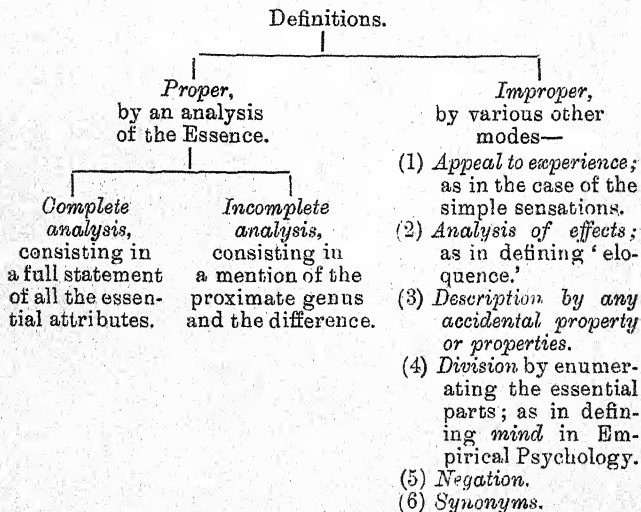
The definition of a name is sometimes understood to be a statement of the proximate genus of the species named together with the attribute or group of attributes which differentiate the species from other species of that genus (*Definition per genus et differentiam*).

This mode of defining can be shown to resolve itself into the strictly scientific mode of a complete enumeration of all the essential attributes. The names of the definition connote exactly the same attributes as the name defined. But the name of the species is not explained in the simplest possible way. The name of the proximate genus will have to be defined again, as there may be many that do not know it. The name of the next proximate genus will then have to be defined and so on, until we come to that of the summum genus which is not definable according to this mode and the definition of which is simply a statement of the essential attributes connoted by the name. If, however, we put together all these differentiae and the essential characters of the summum genus, we shall find that we get a complete enumeration of the essential marks of the species denoted by the given name. This kind of definition may not be permissible in strict scientific logic as it assumes a knowledge in the person to whom it is addressed, of the higher genus to which reference is made, and as the summum genus cannot also be defined



according to this mode. But it is found highly convenient in practice as it is seldom that men are so far ignorant of the meanings of the terms in daily use as to require in the simplest form an explanation of a term of whose use in a particular context they may merely feel uncertain. It is also a definition drawn from the essence.

There are other modes of defining which, not being drawn from the essence, may be regarded as improper modes. The various modes may be represented thus : —



The following rules of Definition are commonly given in logical treatises :—

1. *The definition of a name denoting a species is, strictly, a full statement of the essential attributes connoted by the name.*

2. *It should connote exactly the same attributes as the name defined, and should include neither more nor*

*less*. The individual objects which the name denotes should be exactly equivalent to those denoted by the definition. If even one attribute is added, an attribute which may be a part of the essence of some other species, and which is a separable accident of the species denoted by the term defined, the denotation of the term will be narrowed. Some individuals to whom the term is properly applicable, will not be denoted by the definition. The definition will thus be rendered *too narrow*. The addition of a proprium or an inseparable accident of the same species may not affect the denotation, but it is apt to imply that this is *necessary* for the definition, and that things exist which, while possessing the other attributes, do not possess this proprium or accident. 'An equilateral triangle has three equal sides, and three equal angles' would imply that there may be triangles having the three sides alone equal, but not the three angles. Again, the omission of an essential attribute from the definition will render the definition *too wide*. To define an equilateral triangle as a plane rectilinear figure having three sides, is faulty, because the definition includes all triangles.

3. *It should never contain the name defined or its synonym*. The breach of this rule would frustrate the object of the definition which is to explain the meaning of a term, and would involve the fallacy of 'Circulus in Definiendo,' a circle in definition. Life is 'the sum of the vital functions'; 'Viceroy is a person that exercises viceregal functions'; 'Aristocracy is a form of government in which the supreme

power is vested in persons drawn from the aristocracy.'

4. *The language of the definition should be clear, and should not be figurative or ambiguous.* To define *ignotum per ignotius* (to define an unknown by a still more unknown) equally defeats the purpose of the definition. Aristotle's definition of Soul as 'The First Entelechy of a natural organized Body, having life in potentiality' is a definition of that nature. This rule, simple as it is, had to be laid down, because it was frequently offended against by "mystical philosophers and pompous lexicographers."

5. *It should not be negative where it can be affirmative.* This rule prescribes that the definition, 'Virtue is that which is not vice' is not to be preferred to 'Virtue is conduct conducive to the highest good.' 'Liquid is that which is neither solid nor gaseous' is a negative definition which does not bring out the facts involved in the meaning of 'liquid.' The exclusion of a few attributes as not forming part of a class notion cannot distinctively characterise the class as there may be many other classes not possessing those attributes, and cannot therefore form a proper definition of the class-name. When these attributes are excluded, the question remains, which of the innumerable remaining attributes ought to be possessed by the class in question in order to be entitled to the name. On this ground, some writers seem to have thought that negative definitions are 'almost useless.' It must however be said that in some cases they are the only definitions of any value, and, whenever they are practicable, they are most certain and ex-

haustive. From the point of view of the British subject, an alien is best defined as one who is not a citizen of the British Empire. In specifying from out of a group of six men (all known) a particular man whose name alone is not known, as being liable to punishment, we say that the person is not A, not B, &c., until we exhaust the five names known to the hearer, and then the bearer knows who the man is, that is intended. This illustrates the kind of cases in which negative definitions are useful. Again, there are occasions when it becomes necessary to emphasise what a class is not, more than what it is, because the hearer knows already something of the class in question, but is now apt to confound it with another class which is closely allied to it unless a warning is given as to what attributes it does not possess. It is nevertheless a wholesome rule that negative definition should be resorted to only when the name in question cannot be *adequately* defined positively.

An ancient doctrine relating to definitions consists in the division of these into Nominal definitions and Real definitions, the former being those that explain merely the meanings of terms, and the latter those that unfold the nature of things. But it must be remembered that it is impossible to expound the whole nature of a thing by means of a definition, and that any proposition predicating of a thing any property whatever unfolds by that very circumstance the nature of the thing. All definitions as such, therefore, are definitions of names or nominal definitions, and relate only to the use and application of language. Mr. Mill, while maintaining that this distinction of definitions of names and definitions of things is untenable, holds that there are certain propositions which, while

serving as definitions, imply also a matter of fact, the existence of the subject. 'A centaur is an animal having the upper parts of a man and the lower parts of a horse' is, according to him, a purely Nominal definition; while 'a triangle is rectilineal figure with three sides' is both a definition and an assertion of the existence of the figure specified, since it is impossible to deduce any of the truths of geometry from a proposition dealing purely with names or with the manner of application of a name. He thinks, however, that the definitions of the latter class should not be called definitions of things, but are only definitions of names implying a postulate.

Examine the following definitions :—

- (1) Man is a being with two legs and without wings.
- (2) Logic is the science of the Laws of Thought.
- (3) Rice is an article which is used as food in India.
- (4) Porosity is the property which bodies possess of having pores.
- (5) An acute-angled triangle is one which has an acute angle.
- (6) Logic is the science of Reasoning.
- (7) Diamond is composed of carbon and is combustible.
- (8) Matter is that which is not mind.
- (9) Gold is the most valuable of all metals.
- (10) Logic is the Lighthouse of the Intellect.
- (11) An animal is a sentient organised being.
- (12) A periphrasis is a circumlocutory cycle of oratorical sonorosity circumscribing an atom of ideality lost in verbal profundity.

4. Logical Division.—Logical division should be carefully distinguished from *Physical* partition by which individuals are split up into their component



parts, as when a piece of gold is divided into a number of smaller pieces, and *Metaphysical* analysis by which the attributes of a class or of an individual are severally abstracted, as when the colour, size, shape, &c., of a book are thought of separately. It is the dividing of a genus into its constituent species. Just as definition is the enumeration of the attributes connoted by a name, so, *division* is the enumeration of the constituent species denoted by a name. Definition is the splitting up of the connotation, and division is the splitting up of the denotation, of a name. It does not, however, mean the enumeration of the individuals denoted by the name. It consists in dividing, for instance, rectilineal figures into three-sided figures, four-sided figures, and polygons of more than four sides, the number of sides being the basis or principle on which division is made. It applies only to a class, and not to an individual, nor to the infima species. The class-name should be predicable of each subdivision. If we divide animals, for instance, into men, birds, &c., we can say 'men are animals,' 'birds are animals,' &c. But this is not possible either in the case of physical division, or in the case of metaphysical division. We cannot predicate the name 'tree' of one of its branches, as 'a branch is the tree.' Nor can we say 'the redness of the book is the book.' In every logical division, there is a principle according to which division is made. Such a principle of division is called the *fundamentum divisionis*. This is a generic attribute possessed by each of the divided species with a difference. 'Being



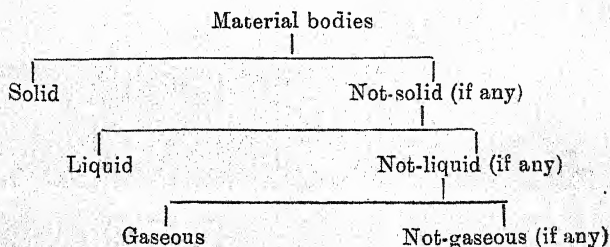
bounded by sides' is the attribute of all rectilineal figures; but the species, triangles, quadrilaterals, pentagons, &c., differ as regards the number of the sides; each possesses that attribute with a specific difference. The genus divided is called the *totum divisum*, and the divided members are called the *membra dividenda*. The same genus may be divided on different principles or bases into different sub-classes, as when triangles are divided into equilateral, isosceles and scalene on the basis of the relative lengths of the sides, and into acute-angled, obtuse-angled, and right-angled, on the basis of the size of the angles. This process is *co-division*. The following are the rules to which every logical division should conform:—

1. The division must be made on one principle.
2. The constituent species must exclude each other.
3. They must be together equal to the genus divided.
4. It must not make a leap. (*Divisio non faciat saltum.*)

The breach of the first rule involves the fallacy of *cross division* in which the constituent members overlap each other, as in the division of four-sided figures into squares, parallelograms, rectangles, rhombuses, &c. Parallelogram includes all the others. No two or more of them should include the same individual or individuals. In dividing triangles into equilateral, isosceles, scalene, and right-angled, we do not keep to a single basis, and the result is, that the same tri-

angle might be both right-angled and isosceles. The fallacy involved in the violation of the second rule is partly provided against by the first rule. Overlapping may be due not only to want of unity in the principle adopted, but also to the indistinct character of the objects to be defined. Some objects are not definitely marked off from one another. They shade into one another by imperceptible gradations. Such objects will have to be put in more than one group, as they possess the differentia of those groups in a greater or less degree ; or they will have to be set apart as ' marginal instances ' between two groups. The third rule provides against any omission in the enumeration of the constituent species, as well as against any improper inclusion. If we omit any species, the division will be narrow, and we shall have divided only a part of the genus. If the species together make up more than the genus, then the division will be the division of the given genus and something more, while some of the species will be out of place in the division. If we divide mankind into Hindus, Mahomedans, Poets, Philosophers, and Englishmen, we would be breaking the first three rules at once. We employ three principles of division at the same time. The fourth rule applies only to progressive division. The species into which a genus is divided may again be sub-divided into their species, and these again may be sub-divided and so on, until we reach the *infimæ species*. This progressive division must proceed one step at a time, and must not omit any intermediate species ; for, if it does, then some of the members of the *totum divisum* will find no

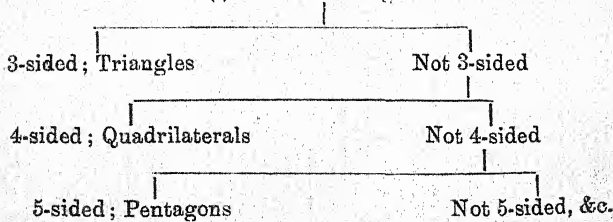
place in any of the divided members. The genus divided must in every case be the proximate genus. Now, the fallacy involved in the breach of the third rule is difficult to be guarded against since, without a previous knowledge of the things divided, it is impossible to decide whether a division is exact or not. The only perfect logical division about which we can have the greatest amount of certainty according to formal logicians, is the kind of division illustrated as follows :—



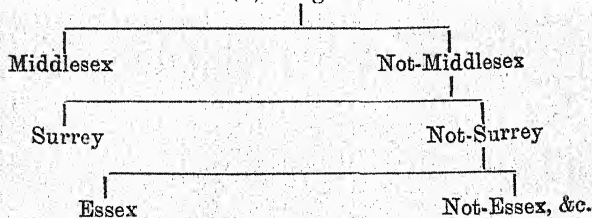
This is what we call division by *Dichotomy* (Gr. = cut into two). It is also called *Exhaustive division*. In one division, all the existing things under the given divisum, do inevitably fall. That the division conforms to the rules, is evident from the very form. But the division is practically useless and inconvenient. It is long, and further we do not know anything about the negative species which embraces all the remaining things in the restricted universe, except that it does not possess the attributes of the positive species. This defect continues to show itself to whatever length we may carry the sub-division. Next, in so far as the division is formal, it is entirely hypothetical, as there is no guarantee of the existence of any of the sub-classes. In dividing *material bodies* into *solids*

and *not-solids*, it is by material examination that we know that some material bodies are solids; and, as for *not-solids*, its existence is also hypothetical unless we make a further appeal to matter. In fact, the last class in the above division does not exist at all. Thus, every step is either partly material, or wholly hypothetical, and a purely hypothetical division is practically useless. Lastly, the division is cumbrous as in the following cases:—

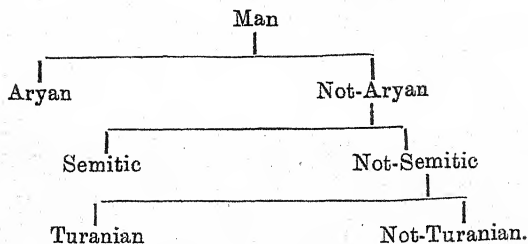
(i) Rectilineal figures



(ii) England



Thus, this division is unnecessary, and even absurdly cumbrous, when the principle of division is the varying number of anything, or when it is possible for us, as in the case of the certain branches of knowledge, to enumerate all the parts at once without violating the rules of logical division. The above two divisions are palpably ridiculous. But in less certain branches of knowledge where it is not possible to avoid oversight, the division supplies us with a safeguard.



Any new race not coming under either Aryan, Semitic or Turanian must fall under the last group.

Examine the following divisions :—

- (1) Terms into General, Connotative, Abstract and Relative.
  - (2) Religions into Hinduism, Mahomedanism, and Christianity.
  - (3) Books into Historical, Mathematical, Philosophical, Quartos, Folios, &c.
  - (4) Tastes into sweet and bitter.
  - (5) Sciences into Abstract, Concrete, Physical and Metaphysical.
-

# BOOK III.

## PROPOSITIONS.

---

### CHAPTER I.

#### *DIFFERENT KINDS OF PROPOSITIONS.*

1. Sub-divisions on the basis of Relation.— Propositions are affirmations or denials of the relations between things. A proposition in Logic corresponds to a sentence indicative in Grammar as distinguished from the other kinds of sentences, imperative, interrogative, exclamatory and optative. These last can be resolved into the indicative form and thus rendered fit for logical treatment. Even the Impersonal proposition can be expanded into the indicative form. 'It rains' may be written as 'Rain is falling.' The characteristic quality of a proposition is to be true or false; and it is only in the indicative form that a truth or a falsehood can be expressed. When a logical proposition is asserted, when a relation is expressed between two things, it is not implied that it must be accepted as a truth. It may be susceptible of being disproved. The business of Deductive Logic, however, is not to inquire into the truth or falsity of a proposition, but to accept the propositions offered to it as true, and to determine what inferences can be drawn from them. The relation that is affirmed or denied in a logical proposition may be affirmed or



denied either *absolutely*, or *under a condition*, or *with an alternative*. In the first case, the proposition is called *Categorical*, as—Some books are not useful. In the second case, *i.e.*, when a statement is made under a condition, the proposition is called *Hypothetical* (or *Conditional*\*) as—If the subjects are already unhappy, it is unwise to levy a tax. In the third case, when the statement is made with an alternative, the proposition is called *Disjunctive* or *Alternative*, as—Either he is in the office or he is in the playground.

Other classifications of propositions founded on Relation have been given by Logicians, in which *Hypothetical* and *Conditional* are used sometimes in a generic and sometimes in a specific sense.

Whately, Mill, and Bain :—

1. Categorical.
2. Hypothetical,  $\left\{ \begin{array}{l} \text{or Compound,} \\ \text{or Complex.} \end{array} \right. \begin{array}{l} (1) \text{ Conditional.} \\ (2) \text{ Disjunctive.} \end{array}$

Hamilton, Thomson, and Jevons :—

1. Categorical.
2. Conditional  $\left\{ \begin{array}{l} (1) \text{ Hypothetical.} \\ (2) \text{ Disjunctive.} \end{array} \right.$

Fowler and Mansel use Hypothetical and Conditional as synonymous :—

1. Categorical.
2. Conditional,  $\left\{ \begin{array}{l} \text{or Hypothetical.} \end{array} \right. \begin{array}{l} (1) \text{ Conjunctive.} \\ (2) \text{ Disjunctive.} \end{array}$

---

\* A distinction is sometimes drawn between Hypotheticals and Conditionals, which will be noticed later on.

Mansel:—

- (1) Categorical.
- (2) Hypothetical or Conditional.
- (3) Disjunctive.

## 2. Analysis of the Categorical Proposition.—

A categorical proposition consists of two terms, the *subject* and the *predicate*, united by a *copula*, and usually preceded by a *sign of quantity*. The subject of the proposition (L. *sub*, under, and *jectum*, to throw, hence that which is thrown under) is that about which something is affirmed or denied; and the predicate (L. *prædicare*, to assert) is that something which is affirmed or denied of the subject.

The *Copula* (*is* or *are*, or any other variation of *be*) does not assert the *actual existence* of the subject, but states simply whether the predicate is *affirmed* or *denied* of the subject. In the example, 'the sun is a shining body,' the copula *is* does not assert the actual existence of the 'sun,' but shows that the predicate 'shining body' is affirmed of it. It is the sign of predication. It is the connecting particle between the subject and the predicate. It merely expresses a certain kind of relation between them. In the affirmative form, it expresses the presence of a particular relation, and in the negative form, it indicates the absence of a particular relation. In neither case does it imply the existence of either of them. '*Is*' is the sign of affirmation and '*is not*' is the sign of negation. Propositions in which the copula finds no place may be changed so that the copula is introduced. Such a change may be found necessary, because

the copula supplies the means by which the subject and the predicate of a proposition are ascertained. 'The sun shines' and 'the virtuous men hate falsehood,' may be changed respectively into 'the sun *is* a shining body' and 'the virtuous men *are* haters of falsehood.' Propositions in the first form were called by the older logicians propositions '*secundi adjacentis*,' and those in the altered form were called propositions '*tertii adjacentis*.' The second is the strictly logical form.

The *sign of quantity* which precedes the subject shows the extent to which the individuals denoted by the name are considered. In 'all men are mortal,' mortality is said to belong, not merely to some men, but to all men. In 'some judges are upright,' uprightness is said to belong to some judges. In these two examples 'all men' and 'some judges' are subjects while 'men' and 'judges' are subject-terms. The subject is the subject term quantified. Miss Jones calls the former *terms* and the latter *term-names*, i.e., she includes the sign of quantity in the meaning of the word '*term*.'\*

All these four elements should appear in the strictly logical form of the Categorical Proposition. It is also desirable that the subject should precede the predicate; but in ordinary discourse the order is sometimes inverted for the sake of effect, as—'Sweet are the uses of adversity.' We cannot therefore wholly rely upon the order of the terms in a proposition in endeavouring

---

\* With this usage we cannot say that every syllogism has three and only three terms.

to discriminate which is its subject and which is its predicate. Ordinarily, we are able to distinguish them from the context as the subject generally signifies a central idea, or an already determined notion to which it is now a question whether the predicate is to be attached. If one term clearly tells us something about the other, then it is the predicate. If a general term is used in its whole extent in an affirmative proposition, then it is the subject. If there is only one singular term in the proposition, it is equivalent to a term taken in its whole extent and is hence to be viewed as the subject. In other cases, if we consider to what question the given proposition is, or may be conceived as, an answer, then the subject and the predicate may become apparent.

3. The quantity of propositions.—Now, coming to the classification of categorical propositions, we divide them first with reference to their *external form* (constituted by the copula and the sign of quantity), and next with reference to their *import*. With reference to their external form, we divide them first according to quantity into *Universal* and *Particular* propositions. A *Universal* proposition is one in which the predication is made of the *whole* of the subject, or of every one of the objects embraced by the meaning of the term; as ‘*All* men are mortal,’ ‘*Every* boy of this class is expected to prepare his lesson well,’ ‘*Each* of these criminals should be severely dealt with,’ ‘*Any* book will serve my purpose.’ The general symbolic expression is ‘All or Every S is, or is not, P.’ In

every one of the above examples, the whole of the subject is intended. Of the several signs of universal quantity, *all* and *any* deserve special notice. *All* is ambiguous, because it can be applied either collectively or distributively. The distributive use of the word is seen in the example, 'All the angles of a square are right angles.' But in 'All the angles of a square inscribed in a circle are equal to four right angles,' it is used collectively. This ambiguity attaches to the symbolic form *All S is P* and not to the form *All S's are P's*. It may be avoided by the use of *every* or *each* instead of *all*. In general, however, *all* is to be interpreted distributively. Again, since anything that is stated to be affirmable of any one object of a species indiscriminately chosen must be true also of all the objects of the species, *any* is recognised as a sign of universal quantity.\* *Every* and *each* are distributive. There may be other signs also denoting that the whole of the subject is intended; but these are the usually occurring ones. In technical

---

\* Dr. Keynes points out that *any* has the same indefinite meaning as the 'logical some' in the following cases: (a) in the interrogative sentence, e.g., 'Are any subscribers dissatisfied, because some non-subscribers were admitted?' (b) in the subordinate clause of a negative sentence, e.g., 'Some people do not think that any men are perfect;' (c) in the antecedent clause of a pure hypothetical, e.g., 'If any men are perfect, some men are mistaken.' But in the case of a conditional (as he distinguishes it from a hypothetical) it has the force of *all*, e.g., 'If any flower is scarlet, it is scentless.' Again, the use of *any* may be restricted by words and clauses which limit its reference to a single individual; e.g., 'Any one who wins this race will have a silver cup.'



language, the subject of a universal proposition is said to be *distributed*.

A *Particular* proposition is one in which the predication is made of only a part of the subject, in which only a portion of the subject is spoken about ; as 'Some men are mortal,' 'A few metals are malleable.' The general symbolic form is 'Some S is, or is not, P.' The point to be noted is, that the subject is absolutely *indefinite* in its application. The signs of particular quantity occurring in common speech are some, a few, a part of, a portion of, certain, many, most, and a few others. But 'some' is adopted in Logic as the typical indicator of particularity. Now, the logical meaning of *some* is different from its popular signification. It is '*some at least, it may be all.*' What is predicated may be true of one, or two, or three, or many, or *all*. It cannot, however, be nothing ; and it does not exclude universality. It does not presuppose in the person that advances the particular proposition, the knowledge that what is advanced about the particular subject can or cannot also be advanced about the remaining part of the subject. If the logician affirms the quality of wisdom to belong to *some* men, he must not be understood as possessing a further knowledge about the rest of men, that they are not wise. A particular proposition with *some* as the sign of particular quantity is not an *Exponible* proposition (*i.e.*, a proposition involving two propositions). If the logician sees a few middle-aged college students and makes the affirmation '*Some* college students are middle-aged,' he speaks from his limited knowledge of the college



students, and he does not know anything about the rest. But *some*, in popular usage, *does* presuppose this distinct knowledge. 'Some college students are middle-aged' implies or involves another fact that some are not middle-aged. 'Some men are wise' implies another fact that 'Some men are not wise.' Thus, when *some* is understood in the popular sense, of *some but not all*, a particular proposition becomes an *exponible* proposition. While the 'some' of Logic excludes *none*, but not *all*, the *some* of common speech excludes both *none* and *all*. Also, the latter usually means more than one. In Logic, however, the reference may be to a single individual, provided it is indefinite; in fact, any indefinite subject gives us a particular proposition. When we say, 'A student of the class was expelled' we do not know exactly who was expelled, and the proposition is equivalent to 'Some (one) was expelled.' A particular proposition may be called an indefinite proposition, but only in so far it may apply to any number from one to all. It is definite in so far as it excludes none. Also, the term 'indefinite' has been applied by logicians to propositions having no sign of quantity before them.

*Most*, as a sign of particular quantity, was introduced into Logic by De Morgan. It means 'More than half.' 'Most S's are P' means 'More than half the S's (but less than all) have been found to be P. It does not, however, necessarily imply the further assertion that the remaining S's are not P. If it does (as it is popularly understood to do), then it is an *Exponible* assertion. A man, however, may say 'Most people were drowned' even

though he does not know of any that were not drowned. Hence, 'most' must be regarded as not excluding 'all.' To denote this fact, that 'most' means 'more than half' but does not exclude 'all,' propositions of the form 'Most S's are P' are called Plurative.

*Few* has a negative force. 'Few men are happy' is equivalent to 'Most men are not happy.' One that advances the former proposition for the sake of conveying information, conveys the information not, however, as involved in *that* proposition, but as involved in the latter assertion in which most refers to the greatest number. 'Few men are happy' does not *necessarily* imply the further assertion that the rest are happy. 'Few' does not exclude 'none.' Hence, 'Few S's are P' must be regarded as a Negative Plurative proposition, and as meaning 'Most S's are not P.' But, excepting De Morgan and Hamilton, other formal logicians have not recognised '*few* and *most*,' as logically distinct signs and have treated them as merely equivalent to '*some*.' '*Most*' in its proper sense of '*more than half*' introduces certain changes in the syllogism, which will be noticed later on. *A few* has an affirmative force. It denotes a small and indefinite number, as 'A few boys were present for the history hour.'

*Numerically definite* propositions are those in which a predication is made of a definite fraction of a whole; e.g., Two-thirds of S are P. This may ordinarily mean either that *exactly two-thirds of S are P*, or that *at least two-thirds of S are P*. But if we are to call our proposition *numerically definite*, we ought to restrict its signification to the former; and then the proposition is exponible. But if we adopt the other meaning, the proposition is particular.

Aristotle recognised two more kinds of propositions according to quantity, namely, the *Indefinite* and the *Singular* propositions.

An *Indefinite* proposition is one in which the quantity of the subject is not marked by any of the signs for universal and particular quantity, or in which it is left vague; as 'Man is mortal,' 'Metals are useful,' 'Liquids find their level,' 'Food is necessary for the preservation of life.' By some logical writers, however, the name *Indesignate* (or Preindesignate) is preferred to indefinite, because this latter term refers more appropriately to particular propositions. Now, since the logical treatment of propositions necessitates a previous knowledge about them whether they are universal or particular, we cannot logically treat the indefinite propositions without first determining their quantitative character. Generally, indefinite propositions are intended to be understood only as universals. Sometimes they may have to be interpreted as particular also. Whether a given proposition is to be viewed as universal or particular can be determined from the context. If the proposition is affirmative and the predicate is known to be an essence or a proprium of the subject, then it is universal. If the predicate is a separable accident, then it is particular. If the predicate is an inseparable accident, since we cannot be sure of the invariability of the concomitance between the subject and the predicate, the proposition should be regarded as particular. In doubtful cases in general, it is safer to regard an indesignate proposition as particular.

A *Singular* proposition is one in which the subject is a singular name; as 'John is wise,' 'The present Viceroy of India is a Protestant,' 'My ring is lost.' Singular

propositions may be regarded for logical purposes as universals, because in them as well, the predicate is affirmed or denied of the whole of the subject. The only difference is, that, while in the universals the subject is *undivided* and the predication is true of each of the individuals composing it, in the singulars the subject is *indivisible* and the predication is true of it as such. Singular propositions have, however, their own peculiarities; for instance, their contradictory is not distinct from their contrary, as in the case of universals. Hence, some logicians have divided universal propositions into general\* and singular with a view to provide for calling attention to the distinction whenever it is necessary to do so. Again, when the subject is a collective name, the name of a group of objects, the proposition is singular, and should hence be regarded as universal. When 'all' is used in its collective signification as a sign of quantity, then the subject is a collective subject.

We have already referred to certain singular propositions in which the subject is not merely a singular term, but is also indefinite in character; *e.g.*, a certain student was expelled. Such propositions should be treated as particulars. The logical 'some' admits of the number 'one' when it is indefinite. Mr. Mansel decides the question in the same way but on the ground that if we have two such propositions with 'a certain student' as

---

\* A distinction is sometimes made between *general* and *universal* propositions, the former being those in which the predication is made of the whole of an indefinite class including both examined and unexamined cases, and the latter, those in which the predication refers only to a definite class every individual instance of which has been examined. But there seems to be no valid ground for such a distinction.

the subject of each, in the same discourse, we cannot be sure that the same individual is referred to in both cases.

Some singular propositions having singular definite names as subjects, may have their predication limited with reference to times or conditions; as, 'John is always naughty;' 'Robert is sometimes generous.' There is a double quantification in such cases, and whether a proposition of this kind is to be regarded as universal or particular depends upon the character of the limitation. Universal propositions may also be doubly quantified in the same way; as, 'All men are sometimes happy,' 'In some colleges, all the subjects are well taught.' There may also be triple quantification, *e.g.*, 'In all colleges, all the subjects are sometimes well taught.'

The two designations, universal and particular, are not considered suitable, because the first of them is applicable also to the inductive inference or the general proposition drawn from a large number of particular instances agreeing in some essential and assignable respects, and the second of them to the individual instances from which that general proposition is derived. Dr. Bain hence suggests the words *total* and *partial* for the two modes of quantity.

4. The quality of propositions.—Next, propositions may be classified according to quality into *Affirmative* and *Negative* propositions. In an affirmative proposition, the predicate is affirmed or asserted to belong to the subject; and in a negative proposition, it is denied of it; as, 'All men are mortal,' 'No men are mortal'; 'Some men are wise,' 'Some men are not wise.' The subject and the predicate of a negative proposition should be predicable of the same



genus ; otherwise, the proposition would be meaningless. 'Justice is not generosity' has a meaning, justice and generosity being species under the genus virtue ; while 'Justice is not red' is absolutely meaningless. Some logicians endeavour to resolve the negative propositions into affirmative, by attaching the sign of negation to the predicate instead of to the copula, as S is *not-P*, Men are *not-mortal*. But the distinction according to quality is a distinction of a marked character, and is one of direct opposition. A negative name expresses the absence of an attribute ; and so, when we predicate it of a subject we really predicate, as Mill points out, not the presence of an attribute but the absence of one. We are saying not that something *is*, but that something *is not* ; and no one will deny that the word best suited to designate this operation is *denying*. "The fundamental distinction is between a fact and the non-existence of that fact." Again, how can we know that S is to be found in what is denoted by not-P without knowing in the first instance that it is excluded from P ? *As much* importance, therefore, must be attached to a negative proposition as to an affirmative one. Though the knowledge of the nature and consequences of the one is involved in the knowledge of the nature and consequences of the other, yet their characters are distinct, and must be recognised as distinct kinds. It must be distinctly borne in mind, therefore, that the sign of negation belongs to the copula, and not to the predicate. Kant regards such propositions as constituting a third kind according to quality and calls them *Infinite*



propositions, since terms like not-P possess an infinite character referring to all objects of the universe except that which is negated. But we need not regard them as distinct, because they are equivalent in sense to negative propositions.

The usual signs of negation are *no*, *not* and *none* along with the negative prefixes, such as, *in*, *un*, *non*, &c. The corresponding negative of a universal affirmative proposition is formed by the prefixing of *no*; as 'All men are mortal,' 'No men are mortal.' 'No' thus indicates universality and negation, being equivalent to *all not*. But, 'All men are not mortal' is ambiguous. The corresponding negatives of singular and particular propositions are formed by the affixing of *not* to the copula; as 'Robert is wise,' 'Robert is not wise;' 'Some men are fools,' 'Some men are not fools.' *None* is emphatic; as, 'None of the gentry would offer him pecuniary help.' 'Matter is indestructible,' 'The ruler is unjust,' 'This substance is non-metallic,' &c., are really negative propositions, though in form they are affirmative. There are words and phrases, again, which denote negation, such as, *few*, *hardly*, *scarcely*, *wanting* in, &c.; as *Few* can do that work; He possesses *hardly* a grain of common sense; Pope was *scarcely* a boy when he could 'lisp in numbers'; Robert is *wanting* in manners.

Combining the quantity and the quality of propositions we get four forms, namely:—

1. Universal affirmative; as, All men are mortal, All S is P ... .. A.
2. Universal negative; as, No men are mortal, No S is P ... .. E.
3. Particular affirmative; as, Some men are mortal, Some S is P ... .. I.

4. Particular negative; as, Some men are not mortal, Some S is not P ... O.

The Latin root *AffIrmo* (I affirm) from which the word affirmative is derived, contains two vowels A and I, which are the symbols respectively of the two affirmatives, universal and particular. The Latin root *nEgO* (I deny) from which the word negative is derived, contains two vowels, E and O, which are the symbols which usually denote the two negatives. Besides these symbols there are other symbolic forms which indicate not only the form of the proposition as a whole, but also what terms have been chosen to denote the subject and the predicate respectively.

SaP = All S is P.

SiP = Some S is P.

SeP = No S is P.

SoP = Some S is not P.

Propositions of the form 'All S is not P,' 'All that glitters is not gold,' are, as we said before, ambiguous. In the absence of any distinct information to the contrary, such propositions are regarded logically as particular negatives. The logical form of 'All men are not perfect' is 'Some men are not perfect.' The reason of this is plain. Whether the asserter of the proposition intends an emphasis on *all* or not, cannot be known unless the proposition is enunciated by him verbally. When it is written down and presented for logical treatment, the matter of interpretation becomes more difficult. If he really intended such an emphasis on the word, then, the proposition being particular negative, our regarding it as universal negative would be assuming an additional information for which we have no warrant, and would lead to inferences other than those intended to be drawn from the proposition. If he did not, however, intend the emphasis and if

he meant the proposition to be regarded as E, then our taking it as O would be assuming simply less than what we are required to assume, and, though it may also lead to other than right inferences, yet, since these would not be absolutely *wrong* as in the former case, our fault would be less serious and consequently excusable. Further, regarding it as O does not preclude the possibility of E being true. Thus it is safer always to regard such propositions as particular negatives. Again, the form of proposition in which the sign of universality is prefixed to the subject and the sign of negation attached to the copula is *the* form which a proposition intended to contradict a universal affirmative is generally made to assume in the mouth of a vehement antagonist; so that, the real meaning of it should be the meaning of the corresponding particular negative which alone truly contradicts the universal affirmative.

5. The distribution of terms in a proposition.—A term is said to be distributed when the whole of its extent is referred to; it is said to be undistributed when reference is made only to a part of its extent, *i.e.*, when information is given only about a portion of the class denoted by the term, but we are left in ignorance with regard to the remaining portion of the class.

The universal affirmative A distributes its subject, *i.e.*, the subject is employed in its whole extent. The predicate can be affirmed of each and every individual thing or person entering into the subject. In the universal affirmative proposition, 'All men are mortal,' mortality can be affirmed of each and every individual being, embraced by the meaning of *man*. All men without a single exception are taken into account, and they fall under the class of mortal beings. It must be remembered, however, that

from the same proposition we are not warranted in understanding also that all mortal beings are men. Though all men are mortal, yet all mortals are not men, for, as we know in this particular instance, there are other created beings in the universe falling under the category of mortal beings. It may happen, however, that the subject and the predicate cover each other wholly. But ordinarily, we do not know anything about the predicate. We cannot say anything about all mortals. The predication is not about these. We leave it an open question whether there are, or are not, any mortals that are not men. Hence the predicate is said to be undistributed.

Secondly, the universal negative *E*, distributes both the subject and the predicate. Both the terms are taken in their whole extent. 'No men are beasts' means no member of the class *men* belongs to the class of beasts. We speak of all the individuals that they do not belong to the class of beasts. But, in making this assertion about all men, the reader will find that we cannot help making another assertion about all beasts at the same time (though in an implied manner), that they do not belong to the class of *men*. We must deny *every* beast of *every* man in order that 'no men are beasts' may be true. The two classes exclude each other in a thorough-going way.

Thirdly, the particular affirmative *I*, does not distribute either the subject or the predicate. 'Some men are fallible' signifies that a part of the class *men* is included in the class of fallible beings, but does not cover the whole of that class. We do not know anything whatever of the rest of human beings, nor do we know anything of the rest of the fallible beings. It may be that 'All

men are fallible is true,' or 'Some men are all fallible beings is true,' or 'All men are all fallible beings is true.' We have examined only some men, and we have found them to be fallible. Thus none of the two terms is taken in its whole extent.

Fourthly, the particular negative O, distributes its predicate, but not its subject. In the assertion, 'Some men are not wise,' we know that the subject is not taken in its whole extent. As for the predicate, we know about all wise beings, that they are not some men. We exclude some men from the class of wise beings, and we must know the whole of this class in order that we may be able to exclude from it a particular individual or individuals. If any of the *men in question* were wise, we should not be excluding them from the class. To exclude a thing from a space is to remove it from every part of it, or the whole of it.

Summarizing these results, we have,

The universal affirmative A, distributes its subject, but not its predicate.

The universal negative E, distributes both its subject and its predicate.

The particular affirmative I, does not distribute either its subject or its predicate.

The particular negative O, distributes its predicate, but not its subject.

or

The universals distribute their subject.

The particulars do not distribute their subject.

The affirmatives do not distribute their predicate.

The negatives distribute their predicate.



or

Proposition.		Subject.	Predicate.
Universal.	{ Affirmative. Negative.	Distributed. Distributed.	Undistributed. Distributed.
Particular.	{ Affirmative. Negative.	Undistributed. Undistributed.	Undistributed. Distributed.

### 6. Complex and Compound propositions.—

A *Complex proposition* is one in which either the subject or the predicate is a complex term.

When a relative clause qualifies or limits either the subject or the predicate, the proposition is complex. When it is a qualifying clause, *i.e.*, when the qualification applies to every individual denoted by the class name, it is called *Explicative* : *e.g.*, The members of the society who were all present subscribed a large amount. The subject here is the complex term 'the members of the society who were all present.' The predicate may also be qualified in the same way. When the relative clause is restrictive, it is called *Determinative* or *Limiting* : *e.g.*, He jests at scars who never felt a wound. It is those only that have never felt a wound, that jest at scars. When the adjectival clause occurs at the end of the sentence as in the above example, it is apt to be mistaken for a part of the predicate. The subject in the example is 'he who never felt a wound.' The symbolic form for such complex propositions as contain limiting or restrictive clauses is *Every S which is M is P*, and this means, If any S is M, that S is P, which is really a hypothetical proposition.

A *Compound proposition* may be defined as one in which two or more propositions are in reality involved.



*Its* contradictory consists in the denial of either of the constituent propositions. There are various classes of compound propositions :—

(a) *Copulative propositions*, which contain two or more affirmative propositions. There may be two or more subjects, or two or more predicates, or both ; as John and James passed the examination ; John is rich and generous ; John and James are rich and generous.

(b) *Remotive propositions*, which contain similarly two or more negative propositions ; as No man nor beast visits my cottage ; No beast looks at me or cares for my kindness ; No man nor beast either does me harm, or gives me help.

(c) *Discretive propositions*, which contain two conflicting propositions (*i.e.*, propositions which are not generally true together) united by *but*, *nevertheless* &c., expressed or understood, as 'He is wealthy, but charitable,' which implies that wealth and charitable 'disposition' do not generally go together. This proposition may be contradicted either by denying his possession of wealth, or by denying his charitable disposition.

(d) *Exponible propositions*, *i.e.*, propositions whose composition is not apparent from the mere form as in the above cases, but which have to be explained before their simpler constituents can be known. These simpler constituents should also be independent propositions, as is usually the case with all compounds, *i.e.*, should be such as cannot be obtained one from another. Particular propositions are exponible, when 'some' is understood in the popular sense of 'some, but not all,' because, 'Some S is not P' is then *implied* in 'Some S is P,' but it can by no means be deduced from it. They are not equivalent propo-

sitions, as their subjects denote two distinct parts of the same class apprehended under the same positive concept. For a similar reason, Numerically Definite propositions and Pluratives are exponible, when they are strictly interpreted; but the latter, as we have seen, should not be interpreted so strictly in Logic. The two following classes of compound propositions are also exposables.

(e) *Exceptive propositions*.—These exclude from the predication a portion of what is denoted by the subject by some such word as *unless* or *except*, as, Every S except MS is P, or Every S is P unless it is M; All the graduates except those of the Cambridge University attended the lectures. The portion excluded is often specifically defined, but it may also be undefined. When the exceptional cases are defined, as in the above example, the proposition may be regarded as a compound of two universals, as we refer in the subject to two *definite* sets of individuals. Taking any one individual at random, we know definitely whether the predicate can be affirmed of that individual or not. The above example may be split up into 'The graduates of the Cambridge University did not attend the lectures' and 'All the other graduates did,' both of which are universal, one being negative and the other affirmative. But it must be noted that the circumstance that is prominently referred to in the given proposition is expressed only by the latter. When the exceptional cases are not known, the proposition is to be reckoned as particular, as we cannot say of some one of the members denoted by the subject whether the predicate can be affirmed of it or not. Such is the proposition 'All the members of the society except a few (or one) were present at the meeting.' This involves the two propositions, 'Some members were present at the meeting' and

'Some were not.' But the main fact of the proposition is what is expressed by the former.

(f) *Inceptive and Desitive propositions.*—When we say that something has begun to exist, or has ceased to exist, we imply in either case two statements, one of which declaring the state of things before the time of which we speak and the other declaring the change after. Thus, the statement, 'After the system of selection by Competitive Examination was introduced, the service showed remarkable vigour' implies (1) There was no such vigour before the introduction of the system, and (2) There *was* such a vigour after it. Similarly, 'With me, coffee has ceased to act as a stimulant for some years' implies (1) It served formerly as a stimulant, and (2) It no longer acts as a stimulant.

*Exclusive propositions* are those in which the predicate is spoken of as exclusively belonging to the subject. It is limited to the subject, *i.e.*, it is referable to the subject alone and to nothing else. The signs denoting exclusive character are *only, alone, &c.*; 'Only the industrious deserve reward,' 'The virtuous *alone* are happy,' 'The wicked alone should be punished.' The subject in all these cases should not be understood in its universal quantity. Reward is merited only by those that are industrious; but even among these there may be some that for other reasons do not deserve the reward. The proposition is in fact equivalent to 'Some industrious men are all those that deserve reward,' 'Some S is all P.' Since, however, no such form is recognised in the traditional scheme, it is transformed for all logical purposes into 'All P is S or No not-S is P.' Both these forms are only immediate inferences from the given proposition. Exclusive propositions should not be regarded as expenables,

as the so-called constituent propositions into which they may be split up are not independent propositions, but mere equivalents. 'Some S is P' and 'No not-S is P,' which may conceivably be regarded as the constituents of 'S alone is P,' are not independent propositions, but the former is obtained by immediate inference from the latter.

7. The modality of propositions.—Propositions have been classified as *pure* and *modal*. A pure proposition is one in which it is simply asserted that the predicate does or does not agree with the subject, whereas in a modal proposition an explicit reference is made to the *mode* or manner in which such an agreement or disagreement is asserted.

There has been difference of opinion among logicians as to what should constitute modality. Aristotle recognised four forms of modality,—the Necessary, the Contingent, the Possible, and the Impossible. The Necessary is that which is unchangeable, which cannot be different from what it is, as in the case of all the deductions of Geometry. The Contingent is that which happens to be, but which might have been different from what it is. The Possible is what is not, but what may be in the future. The Impossible is what can never be. Some scholastic logicians extended the species of modality to all adjectival or adverbial modifications in a proposition under the name of *material modality*; as, Gladstone was a *great* man, He runs *awkwardly*. Time-qualifications were also included under modality, as, He ran *yesterday*.

Some logicians hold that strictly speaking a proposition ought to be called *modal* only when there is reference in it to the amount of belief with which it is accepted. This



is the *formal modality* of the scholastic logicians. The distinctions indicated by the four forms of Aristotle are based on material considerations, and it is held that from a subjective point of view there is hardly any difference between the Necessary and the Impossible on the one hand, and between the Contingent and the Possible on the other. Kant's doctrine of modality has been understood to relate essentially to the amount of assurance with which a proposition is accepted. He divides judgments according to modality into (a) *apodeictic* judgments—*S must be P*, (b) *assertoric* judgments—*S is P*, and (c) *problematic* judgments—*S may be P*. The assertoric judgment expresses a universal connection. The apodeictic judgment expresses the same connection in an emphatic manner. The problematic judgment expresses it as a probable truth. It is easy to see, however, that no difference can be recognised between apodeictic and assertoric judgments. We are either fully certain of the truth of a judgment as resting on complete proof, or doubtful about it. In the latter case, our doubt may be of various degrees, and it rests upon the amount of probable evidence that is available. From the point of view of knowledge, then, the only modals that need be recognised are the Certain and the Probable.

Extreme Conceptualists—as Mansel and Hamilton—consider the treatment of modals as extra-logical, as they have reference to the matter of predication and not to its form.

#### 8. Hypothetical propositions:—

(a) *Their nature.*—A Hypothetical proposition is one in which the truth of one proposition is asserted to depend upon the truth of another; or in which

the occurrence of one event is asserted to depend upon the occurrence of another event; as 'If a man is virtuous, he is happy,' 'If the weather is fine, we go into the country,' 'If the prices rise, the people suffer.' In each of these propositions there are two facts, and one of these is asserted to depend upon the other. The proposition which contains the condition is called the *Antecedent* or *Protasis*, and that which contains the dependent fact is called the *Consequent* or *Apodosis*. In the first example, 'If a man is virtuous' is the antecedent, and 'he is happy' is the consequent. 'If' and 'provided that' are usually the signs introducing the antecedent.

It will be seen that in every hypothetical proposition either a relation of dependence is expressed between two properties or two sets of properties both co-inhering in the same subject, or a relation in time or space between two occurrences is asserted. When we say, 'If a man is virtuous, he is happy,' we mean that his happiness is contingent upon his being virtuous, and that when the latter attribute is found in him, the former will be found also. The two attributes will be found to be connected in nature. When, again, we say 'If the barometer is taken up a mountain, it falls,' we express a relation of two events occurring in experience. The symbolic form which brings out the essential character of the hypothetical proposition as illustrated by the two foregoing examples is *If S is M, it is P*, which indicates that *P* always accompanies *M*. But hypotheticals fall also in the form, *If A is B, C is D*, which contains four terms. In these forms of hypotheticals also, the essential feature is the dependence of one fact upon another. Either one event is



asserted to follow another as its effect, or two facts are asserted to occur as co-existent facts. 'If the weather is fine, we go into the country,' 'If the government of a country is good, the people are happy,' 'If the prices rise, the people suffer,' 'If the patient recovers, the doctor has his fees,' 'If a child is spoilt, its parents suffer,' 'If patience is a virtue, there are painful virtues,' 'If the barometer falls, we shall have rain,' &c., are examples of this class. Though there are four terms in each of these examples, yet the real subject of thought is the same in both the antecedent and the consequent, as may be seen from the fact that it is possible by a slight change in the wording to express the judgment by a proposition of the form, *If S is M, it is P*, which alone brings out the essential unity of the hypothetical judgment. The above examples are respectively equivalent to 'If we get fine weather, we go into the country,' 'If the people of a country are well governed, they are happy,' 'If the doctor cures the patient, he has his fees,' 'If the prices rise, they bring suffering on the people,' 'If a child is spoilt, then it brings suffering on its parents,' 'If virtue includes patience, then it may be painful,' 'If the state of the atmosphere causes a fall in the barometer, then that state will bring rain.' Every proposition which is really hypothetical can be thus changed so as to bring out the unity of the judgment though in some cases such a reduction may not be easy. In other hypotheticals, the union between the antecedent and the consequent is found either in the subject of the latter being a species under the wider subject of the former, as in the example 'If the aborigines of India had no religion, the Khonds had none,' or in the subject of both being species under the same genus, as in 'If virtue is involuntary, vice is involuntary.' The

most general symbolic expression that may be adopted for the hypothetical relation is If  $P$ , then  $Q$ .

Dr. Keynes, following Mr. W. E. Johnson, distinguishes between Conditional propositions and Hypothetical propositions. He calls the type of propositions sketched out in the foregoing paragraphs by the name 'Conditional,' and gives the name 'Hypothetical' to those propositions which contain two propositions of independent import "the relation between which cannot be resolved into any time or space relation or into an affirmation of the co-inherence of attributes in a common subject." In the example 'If it is a sin to covet honour, I am the most offending man alive,' he says that the antecedent and the consequent are two independent propositions retaining their full import though they are separated from one another, and no point of unity exists between them. The consequent does not refer us back to the antecedent as in the example 'If an import duty is a source of revenue, it does not afford protection.' Other examples which he mentions are, 'If patience is a virtue, there are painful virtues;' 'If there is a righteous God, the wicked will not escape their just punishment;' 'If virtue is involuntary so is vice;' 'If what you say is true, I am a Dutchman;' 'If that boy comes back, I will eat my head.' It will be seen that some of the above examples can be reduced to the form *If  $S$  is  $M$ , it is  $P$* , a common subject of thought between the antecedent and the consequent being discoverable in them. In the other cases where such a unity does not exist, the hypothetical form is adopted to give emphasis to a belief by showing that we shall have to acquiesce in the truth of even a glaringly absurd consequence in case we give our assent to its opposite.

(6) *The relation of Hypothetical to Categorical propositions.\**—It is held that in every hypothetical proposition as distinguished from a categorical, some human doubt is expressed. But it is clear that if there

---

\* This section may be omitted on a first reading.

is any element of doubt in a hypothetical proposition, it cannot attach to the relation between the antecedent and the consequent, but must be supposed to belong to the actual occurrence of the antecedent. The dependence of the consequent upon the antecedent is not held to be a matter of doubt. With regard to the actual occurrence of the antecedent, it is no doubt true that this is not in any sense presupposed in those cases in which the connection between the antecedent and the consequent is obtained by direct experimental inquiry which is not suggested by actual observation but to which we are incidentally led in the course of some investigation, though the ultimate proof of any connection whatsoever can only be said to rest on an appeal to observation or fact. In other words, when the hypothetical proposition expresses a connection of causation or co-existence as the result of a rigorous inductive analysis independently of specific experience, and when the connection is between two attributes or two sets of attributes, then the occurrence of the antecedent is no doubt not a presupposition. 'If sharp canine teeth and a particular digestive apparatus occur, then the animal is carnivorous' is a proposition which expresses a necessary relation between a certain complex physiological apparatus and the carnivorous habit. The proposition is intended only to bring out this abstract relation. But, as this relation\* is always found embodied in concrete

\* To say that Newton's First Law of Motion is not embodied in concrete reality is true only in one sense. Though it may not be realised in all its purity, yet it exists in combination with other relations.

reality either in all its purity or in combination with other relations, the same may be expressed as 'If an animal possesses sharp canine teeth and a particular digestive apparatus, then it is a carnivore' or as 'All animals possessing sharp canine teeth and a particular digestive apparatus are carnivores.' Symbolically, 'If S is M, it is P' may equally well be expressed as 'Every S which is M is P' or 'All SM is P.' Thus, the Categorical proposition and the Hypothetical proposition are interchangeable, so long as the former is understood in connotation, as a mere concrete embodiment of an underlying essential relation. If the subject of the categorical is a compound term like SM, it is because a simple term is not available to signify that part of its essence which is connected with the predicate. Even when we understand it in denotation, as the abstract relation signified by the hypothetical proposition can never exist except as realised in some such concrete embodiment in space or time, we may say without much sacrifice of accuracy that the two propositions are interchangeable and the form of the hypothetical which better expresses the fact of the relation being realised in some concrete embodiment is 'If any S is M, that S is P,' or '*Whenever or wherever an S is M, it is P.*' It must be remembered that universal hypotheticals may also express facts empirically observed; and in such cases the interchange between the categorical and the hypothetical can be effected without loss of meaning. Even in particular cases of conditional assertion in which one event is made to depend on another as in



the example, 'If the patient recover, the doctor will have his fees,' the equivalence can be made out so long as we remember that in the categorical propositions the existence of the subject is not logically implied. The above hypothetical form can be reduced to 'The recovery of the patient is the payment of fees to the doctor.' And this form does not necessarily imply that the patient has actually recovered, and the doctor must be paid. We do not know if the patient has, or has not, recovered. In the case of a universal categorical also, embodying a general connection of attributes, though the denotative expression finds its justification in the general fact that the abstract relation can never exist except as embodied in time and space, yet we may not be aware of the existence of such cases of concrete embodiment so as to be able to reason about them for practical purposes. This is what we mean when we say that in categorical propositions the existence of the subject is not implied.

It has, however, been objected, that if a categorical proposition contains a simple term as the subject (which will be the case when the universal categorical is obtained directly by actual examination of instances), we cannot pass from it to the hypothetical. It will not do, it is said, to change 'All lions are quadrupeds' into 'If any creatures are lions, they are quadrupeds,' since this involves the introduction of a new term, and passing back again to the categorical we should have 'All creatures which are lions are quadrupeds,' a proposition not equivalent to our original proposition. But it is not clear how the term 'lions' which includes in its connotation the essence of

'creatures' can be regarded as anything different from 'creatures which are lions' which also connotes exactly the same thing. The latter term no doubt draws special attention to the differential marks of lions and imports that those are invariably connected with what is connoted by the predicate. But it is also true that in the proposition 'All lions are quadrupeds' the specific term 'lions' is used not to draw attention to any connection between what is connoted by 'creatures' and what is signified by 'quadruped,' but to draw attention to the connection between the specific attributes of lions and the connotation of 'quadruped.' When a simple term occurs as the subject of a categorical proposition, it indicates that the proposition is a case of embodiment in concrete reality of one or more ultimate connections. The simple subject can always be split up into two terms, one connoting the specific attributes of the species denoted by the term, and the other connoting the specific attributes of the proximate genus. Particular hypotheticals imply specific experience as much as particular categoricals; as, 'Sometimes when mistakes are committed, they are not rectified.' This evidently rests upon previous empirical observation quite as much as the proposition 'Some mistakes are not rectified.' They are therefore interchangeable.

If the consequent is held to be an inference from the antecedent, or if the antecedent is held to be a justification for the consequent, then the hypothetical and the categorical are not interchangeable. But in reality, the justification for passing from the antecedent to the consequent is to be found not in the antecedent itself but in some other inquiry which has yielded the hypothetical. In the proposition itself, there is no justification. Our right to pass from the one to the other is merely asserted.



(c) *Quality and Quantity of Hypothetical propositions.*—The distinctions of quality and quantity can also be applied to Hypothetical propositions. A hypothetical proposition is affirmative or negative according as the consequent is affirmative or negative. It is universal or particular according as the connection asserted to exist between the antecedent and the consequent rests on conclusive proof, or on a few empirical observations. In the former case, the consequent is affirmed to accompany the antecedent in all cases, and in the latter case it is affirmed to accompany it in some cases.

If any S is M, then always it is P.....A

Sometimes if an S is M, it is also P.....I

If any S is M, then never is it also P....E

Sometimes if an S is M, it is not also P.....O

When the event referred to in the antecedent of a hypothetical proposition is such as can happen but once, the proposition is of the nature of a singular proposition, *e.g.*, 'If he dies, his brother will succeed.'

#### 9. Disjunctive propositions:—

(a) *Their nature.*—A Disjunctive proposition is one in which an alternative predication is made. The symbolic forms are *Either A is B, or C is D, and S is either P or Q.* The first form is suited to express alternative predication between two independent facts or events, *e.g.*, 'Either the witness is perjured, or the prisoner is guilty'; and the second form is suited to express the predication of an alternative between a definite number of attributes about the same subject,

e.g., 'He is either a doctor, or a lawyer, or a pedagogue.' It has been pointed out that two propositions can be said to be really *disjoined* only when it is denied that they are both true rather than when it is asserted that one or other of them is true; and that the word *alternative* is more appropriate to express the latter assertion. But the word *disjunctive* has been used by all logical writers in this sense, and it is better that we also adhere to the common usage.

(b) *Their import.*—The important question in connection with disjunctive propositions is, whether the alternatives should necessarily be regarded as mutually exclusive. Does the proposition, *Either A is B or C is D*, import that both cannot be true? Does the proposition, *S is either P or Q*, necessarily mean that S cannot be both? It is true that in most cases, the alternatives are found, as a matter of fact, to be mutually exclusive. When we say 'John is either in his office or in the church,' it is clear that he cannot be in both places at the same time. 'The patient is either dead or alive,' 'The crow is either black or white,' 'The general will either lose the battle or win it,' 'The table is either round or oval,' 'Either the rebellion will be crushed, or the king will be dethroned,' are other examples in which the alternatives are mutually exclusive. But in these cases the alternatives themselves are such as are incompatible with each other and cannot be true together. We have no evidence in them that the *form* of the alternative (or disjunctive) proposition necessarily implies their mutual exclusion. Every-day language,

on the contrary, affords examples to show that when the alternatives employed in a disjunctive proposition are compatible terms, they need not be mutually exclusive. 'A book is valued either for the usefulness of its contents or for the excellence of its style' does not imply that when a book possesses both the merits it has no value. If it is announced regarding a certain appointment that the candidates for it ought to be members either of the Oxford University, or of the Cambridge University, or of the London University, it does not imply that the candidate who has been a member of some two of these Universities or even three, is disqualified by that circumstance to be appointed to the post. 'He is either reserved or cunning,' 'He is either a knave or a fool,' 'He pleaded his cause either for money or for distinction,' are other examples which illustrate that there is nothing in the *form* which makes the alternatives mutually exclusive.\*

It may be said that common language is elliptical, and that in logic we ought not to admit any disjunctive proposition the alternatives of which do not mutually exclude one another. But, as Dr. Keynes points out, if logic is to be of any practical utility,

---

\* It is argued by Mr. Bradley that when a person is said to be either a fool or a rogue, the possibility of his being both is not *denied*, but is not *contemplated* as it is irrelevant to the occasion, the speaker being perfectly satisfied provided he is one or the other. His statement is thus practically right, but formally wrong. "Our slovenly habits of expression and thought are no real evidence against the exclusive character of disjunction."

its forms should as far as possible agree with the forms of ordinary speech. And when this is admitted, on the exclusive view, the common form 'He is either a fool or a knave' is a condensed mode of expression, the full form being 'He is either a fool or a knave, but not both.' But this is composed of two distinct propositions, each of which may be the basis of a distinct line of inquiry leading to distinct results. The two facts, therefore, must be kept distinct from each other and not blended into one as such a blending would lead to confusion of thought. On the non-exclusive view, we shall be simply proceeding upon the information we have got without implying more than we intend, and any inference that we may draw from such a statement will never be more than is absolutely justifiable.

(c) *Their relation to Hypothetical propositions.*—Disjunctive propositions can be reduced to the hypothetical form. It will be found that, on the non-exclusive view of alternation, there is one hypothetical form into which any given disjunctive can be reduced, while on the exclusive view there are two forms. On the non-exclusive view, the proposition 'He is either a fool or a knave' is no doubt primarily convertible into two propositions, 'If he is not a fool, he is a knave,' and 'If he is not a knave, he is a fool.' But these two propositions are contrapositives\* the one of the other, and therefore mutually inferable. Therefore, either of them by itself can fully express the meaning

---

\* *Vide* Chapter on Conversion.



of the given disjunctive. On the exclusive view, there are primarily four forms into which any given disjunctive can be thrown. For example, the proposition, 'He is either in his office or in the church' is reducible to 'If he is not in his office, he is in the church,' 'If he is not in the church, he is in his office,' 'If he is in his office he is not in the church,' and 'If he is in the church, he is not in his office.' But, as before, the second two of these four forms as well as the first two are mutually inferable as they are contrapositives the one of the other, and hence the full meaning of the proposition can be expressed by the two forms, 'If he is in the church, he is not in his office' and 'If he is not in the church, he is in his office.'

(d) *Quality and Quantity of Disjunctive propositions.*—The distinctions of quality cannot be applied to disjunctive propositions since propositions like '*S is neither P nor Q*' do not give us any choice of alternatives one or other of which must be affirmed to be true (which is the essential fact in a disjunctive proposition) but deny that either of them is true. Distinctions of quantity, however, are applicable. We may have 'All S is P or Q,' and 'Some S is P or Q,' or 'In all cases S is P or Q' and 'In some cases S is P or Q.'

We shall give here a few examples and exercises in the discrimination of propositions.

(1) Not every report is true..... O

This proposition may be written, 'Every report is not true' or 'All reports are not true,' and is like 'All that

glitters is not gold.' It should be regarded as particular negative for reasons specified already.

(2) Not all the efforts of the officials were able to save the city from the floods.....E

This appears like the foregoing, but is not so in reality. 'All' is used collectively, and the 'efforts of the officials' can or cannot produce the given effect only as a whole. The proposition, then, is equivalent to "The total of the efforts, &c., was not able to save, &c." It is thus universal negative.

(3) None think the fools great but the fools themselves.....A or E

This should first be written "None but the fools themselves think the fools great," and is an exclusive proposition equivalent to either "All that think the fools great are the fools themselves."... A, or, "No not-fools think the fools great.".....E

(4) The whole is greater than its part. This is a general axiom and means "Any whole is greater, &c." It is therefore.....A

(5) Few men are rogues.....O

This = Most men are not rogues.

(6) He can't be wrong whose life is in the right.....E

The relative clause here qualifies the subject. The whole proposition is general and should be written "None of those whose lives are in the right can be wrong."

(7) Men are not what they seem.....O

Men = Some men.

(8) One bad general is better than two good ones....A

This is a universal affirmative proposition; 'one bad general' meaning 'any one acting alone' and not any particular individual.

Describe the logical form and peculiarities of the following propositions, stating precisely in each case what you regard as the subject and predicate :—

(1) A bird in the hand is worth two in the bush.



- (2) Not to know me argues thyself unknown.
- (3) Resistance applies only to occupied space.
- (4) The weather is fine.
- (5) A certain king had two educated sons.
- (6) There can be no smoke without fire.
- (7) Two and two make four.
- (8) A little knowledge is a dangerous thing.
- (9) Not one of the prisoners was set at liberty.
- (10) One of you at least should be able to answer this question.
- (11) Better late than never.
- (12) Not many of the candidates failed.
- (13) Two straight lines cannot enclose a space.
- (14) Wherever there is a large crowd, cases of theft are sure to occur.

## CHAPTER II.

### *MODERN ADDITIONS TO PROPOSITIONAL FORMS.*

1. Those arising from the quantification of the predicate:—

(a) *The forms and their symbols.*—In the four propositional forms of Aristotelian Logic, no explicit reference is made to the quantity of the predicate. This is determined only by the quality of the proposition, negatives distributing their predicates and affirmatives not distributing them. Sir W. Hamilton has, by explicitly quantifying the predicate, recognised eight propositional forms:—

	Hamilton's Symbols.		Thomson's Symbols.	
All S is all P,	... <i>Afa</i>	...	U	... SuP
All S is some P,	... <i>Afi</i>	...	A	... SaP
Some S is all P,	... <i>Ifa</i>	...	Y	... SyP
Some S is some P,	... <i>Ifi</i>	...	I	... SiP

Hamilton's Symbols. Thomson's Symbols.

No S is any P,	... <i>Ana</i>	...	E	...	SeP
No S is some P,	... <i>Ani</i>	...	$\gamma$	...	S $\gamma$ P
Some S is not any P,	... <i>Ina</i>	...	O	...	SoP
Some S is not some P,	... <i>Ini</i>	...	$\omega$	...	S $\omega$ P

(b) *The advantages claimed for the doctrine.*—

As a reason for quantifying the predicate, Hamilton adduces as the fundamental postulate of logic "that we be allowed to state explicitly in language all that is implicitly contained in thought." This postulate, and especially the phrase, "implicitly contained in thought" suggests to us the function of all formal logicians in drawing conclusion from premises, the conclusion being nothing but what is implicitly contained in the premises. But what Hamilton means by the postulate is not this, but that we should be allowed to state explicitly in language what is *explicit* in thought, that is to say, we ought to avoid in logic all elliptical forms of expression. His idea is, that whenever we formulate a proposition, we are thinking of some quantity of the predicate, and if we are to avoid elliptical forms of expression we ought to state that quantity explicitly in language. Secondly, it is maintained that predication would be unintelligible without a quantified predicate. "Predication is nothing more or less than the expression of the relation of quantity in which a notion stands to an individual, or two notions to each other. If this relation were indeterminate—if we were uncertain whether it was of part, or whole, or none—there could be no predication." Thirdly, certain practical advan-

tages are claimed for this doctrine of the quantification of the predicate. It is said that the process of conversion is much simplified. When the subject and the predicate of a proposition are both quantified, the proposition reduces itself to an equation, it then being immaterial which is read as the subject and which as the predicate. Any proposition can thus be converted simply. 'All men are some fallible beings' can be converted into 'Some fallible beings are all men,' and 'Some metals are not any brittle substances' can be converted into 'No brittle substances are some metals.' The simplification of the laws of the syllogism is mentioned as another advantage resulting from the doctrine of quantification. Fourthly, it is said that the new forms are required to express certain relations which cannot otherwise be so simply expressed. When the subject and the predicate of a proposition express co-extensive classes, as in 'All equilateral triangles are equiangular,' the form U alone is suitable; even  $\omega$  is said to be necessary, because in logical divisions we are constrained to think that some portion of the whole divided is not some other portion; as when in dividing the genus 'soldier' we should say to ourselves 'Some soldier is not some soldier; for Some soldier is (all) Infantry, Some soldier is (all) Cavalry, &c.; and (any) Infantry is not (any) Cavalry.'

(c) *Objections.*—Now, the question arises, is it true that the predicate of a proposition is thought of as a determinate quantity? Many will answer, "No." In fact, the predicate is not thought of as a quantity at all. When we judge that 'All diamonds are

combustible,' the subject strongly suggests to us the objects denoted by it, while the predicate raises the thought of combustibility as an attribute. The thought of combustible *things* does not naturally occur to the mind as relevant to the subject under consideration, and we do not inquire whether there be other combustible things than diamonds in existence. Mill points out that if the predicate of the ordinary universal affirmative is understood in thought as of particular quantity, then there should be no difficulty for the tyro in logic in understanding that the proposition cannot be converted *simply*, but *only by limitation* \*; that is, that the proposition 'All S is P' is not equivalent to 'All P is S' but only to 'Some P is S.' But he is able to understand this fact only when a particular example is mentioned to him in which he already knows that the simple converse would be false, such as, 'All men are animals, therefore, all animals are men.' These psychological considerations also dispose of his second argument, *viz.*, that unless we are definitely limited to some quantity we cannot have predication. The changes introduced into the syllogism by the doctrine of quantification will be referred to in a subsequent chapter, and it will then be found that the syllogism is in no way simplified.

Again, even when we understand the predicate in denotation, the quantified form 'All S is some P' is unnecessary for two reasons. In the first place, it

---

\* This anticipation of conversion is necessary for illustration.



is equivalent to the unquantified form 'All S is P' when 'some' is understood in the sense of 'Some at least, and it may be all' with this difference that whereas in the former attention is called to the circumstance whether there be more P's than are S's, in the latter no such question is raised or even suggested. But this farther question is unnecessary to be raised or even suggested, because inquiry into it will yield results which may serve a separate utility, but are not wanted for the purpose on hand. Secondly, when 'some' is understood in the sense of 'Some at most, but not all,' the quantified form 'All S is some P' is an explicable proposition resolvable into 'All S is P' and 'Some P is not S.' But in logic compound forms of expression should be avoided as they render the detection of fallacies difficult. Similarly, 'All S is all P' is a compound of 'All S is P' and 'All P is S.' It is said that this form is specially suited to express propositions in which the subject and the predicate are co-extensive. But if we leave out of consideration verbal or defining propositions which must certainly be co-extensive, but whose main function is not to express identity of denotation but to make explicit connotation, real propositions which affirm propria or concomitance and in which the subject and predicate are co-extensive, are extremely rare; and the few cases of such conjunctions that are actually found are usually expressed in other forms than the one proposed. 'All mercury is all liquid metal' is usually expressed as 'Mercury is the only liquid

metal'; and 'All rational is all risible' is expressed as 'All rational is risible,' and 'All risible is rational.' Whatever can be proved from the compound form can also be proved from one or both of its elements.

For similar reasons, 'Some S is some P' and 'Some S is all P' are unnecessary. The former is the same as the unquantified form when 'some' means 'some at least.' But when 'some' means 'some only,' it is a compound of 'Some S is P,' 'Some S is not P' and 'Some P is not S'; and 'Some S is all P' is a compound of 'Some S is not P' and 'All P is S.' The best justification for the latter form is that in converting a universal affirmative we are enabled to express in the converse the full meaning of the convertend.

The two additions to the affirmative forms have been admitted by some logicians, but the additions to the negative forms have not been received by any other logician. 'No S is some P' and 'Some S is not some P' are never found in ordinary use.

Lastly, Dr. Keynes points out that the doctrine is "sufficiently condemned by its want of internal consistency." The expounders of the new doctrine are not agreed as to the meaning to be attached to 'some' in the eight propositional forms recognised by Hamilton. Professor Baynes says that it ought to be understood in the sense of 'some only.' If so, we get only five distinctive propositional forms and not eight, namely,—*All S is all P, All S is some P, Some S is all P, Some S is some P, No S is any P.* The fourth of these forms necessarily implies *Some S is not any*



*P* and *No S is some P*, while *Some S is not some P\** is seen to be equivalent to *All S is all P*. Thomson, Bowen and Mr. Findlay adopt the meaning 'some only.' Spalding strictly adheres to 'some at least.' Hamilton himself remarks that *some* "is held to be a definite *some* when the other term is definite," i.e., in *A* and *Y*,  $\gamma$  and *O*: but "on the other hand, when both terms are indefinite or particular, the *some* of each is left wholly indefinite," i.e., in *I* and  $\omega$ . From this sentence it is not clear in what sense he used the term *some*. He only says that when one of the terms of a proposition is definite, the other term, though particular, is also definite, as it must denote those objects only which are denoted by the definite term. In 'All men are some fallible beings' the 'some fallible beings' referred to are 'all men.' But we cannot be sure that this does not preclude the possibility that the 'some fallible beings' are 'all the fallible beings.' What results will respectively follow from understanding 'some' in the new doctrine as 'some only' and as 'some at least' will be briefly noticed in a subsequent chapter.

2. The additional propositional forms arising from the full recognition of contraries.—Every term has its corresponding contrary term which denotes, according to DeMorgan, all the remainder

---

\* "*Some but not, all S is not some but not all P* informs us that certain *S*'s are not to be found amongst a certain portion of the *P*'s but that they are to be found amongst the remainder of the *P*'s, while the remaining *S*'s are to be found amongst the first set of *P*'s. Hence *all S is P*; and it follows similarly that *all P is S*."

which is gained after subtracting what the positive term denotes from the given universe. S has its negative term not-S and P has its negative term not-P. DeMorgan does not consider all the possible modes of predication exhausted until the negative terms are recognised and regarded as subjects and predicates.

Denoting not-S by s and not-P by p we have the four terms S, P, s, p, any two of which may be used as subject and predicate in a proposition. We have thus the four couples—S, P; S, p; s, P; s, p—to be given under the four forms of predication, A, E, I, and O. We obtain the following sixteen forms:—

1. All S is P.	1. Some S is P.	1. No S is P.	1. Some S is not P.
2. All S is p.	2. Some S is p.	2. No S is p.	2. Some S is not p.
3. All s is P.	3. Some s is P.	3. No s is P.	3. Some s is not P.
4. All s is p.	4. Some s is p.	4. No s is p.	4. Some s is not p.

Taking all the A's, we find *All S is P* is the usual form. *All S is p* is *All S is not-P* which is the same as *No S is P\** of the old scheme. *All s is P* or *All not-S is P* is the same as *No not-S is not-P* which means again that nothing is both not-S and not-P, or that *everything is either S or P*. No university which is not a teaching body is also a not-examining body, i.e., every university is either a teaching body or an examining body. This is a *new form*. It means that everything is either in S or in P (or in both). *All s is p* is *All not-S is not-P* (all not-mortals are not-men) which is the same as *All P is S*. This is a *new form*, so far, that the symbols are transposed.

---

\* This and the following transformations will appear evident after *obversion* and *conversion* are studied.

Taking the I's, we find that the first is the usual form. The second is *Some S is not-P* which is the same as the common particular negative *Some S is not P*. The third, *Some not-S is P*, is equivalent to *Some P is not-S*, or *Some P is not S*, or *All S's are not some P's*. This is also a new form. The last, *Some not-S is not-P*, means some things which are not S's are not also P's, i.e., *some things are neither S nor P*. This is another new form.

Taking the E's, we find that the first is the common form, the second *No S is not-P* is the same as *All S is P*, the third *No not-S is P* is the same as *No P is not-S* or *All P is S*, a new form already obtained, and the fourth *No not-S is not-P* means, as pointed out before, nothing is both not-S and not-P or *Everything is either S or P*, a new form also obtained already.

Taking the O's, we see that the first is the usual form, the second *Some S is not not-P* is the same as *Some S is P*, the third *Some not-S is not P* is equivalent to *Some not-S is not-P* which is the same as *Some things are neither S nor P*, a new form already obtained, and the last *Some not-S is not not-P* is equivalent to *Some not-S is P* or *Some P is not-S* which again is the same as *Some P is not S*, also a new form already obtained.

Thus, the additional forms arising from the full recognition of contraries are :—

- (1) All P is S,
- (2) Some P is not S,

which are A and O with the terms reversed.

(3) Everything is either S or P.

(4) Some things are neither S nor P.

The third is a disjunctive proposition, while the fourth contradicts what the third affirms.

---

## CHAPTER III.

### MODES OF NOTATION.

1. The criteria of good notation.—The object of representing propositions by means of geometrical diagrams is to make clear at a glance the relation between the subject and the predicate. Any diagrammatic scheme, therefore, that is put forward for acceptance should satisfy the following conditions :—

(1) The diagrams used should be *self-interpreting* as soon as the principle on which they are constructed is known. In other words, the relation between the subject and predicate should become manifest from the mere form without any need for further explanation or commentary.

(2) The diagrams should be *adequate*; that is, they should represent *completely* the relations which they are intended to represent. That is to say, when a proposition implies two possible relations between subject and predicate, it should not be represented by a diagram which illustrates only one of them.

(3) They should be capable of representing all the propositional forms recognised in the system of Logic for which they are devised. It will be found



that a scheme of diagrams, presently to be described is suited to represent universals better than particulars. Also, no proposition should be left ambiguously represented.

(4) The scheme should be such as can represent combinations of propositions with as much ease and simplicity as single propositions.

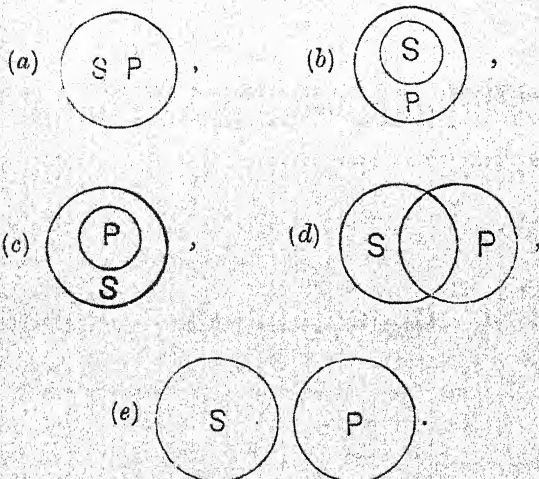
Dr. Keynes says that the further condition that is sometimes added, namely, that each propositional form should be represented by a single diagram and not by a set of diagrams, is not essential, for the reason that indeterminate relations between subject and predicate are much better brought out by alternative diagrams than by a single diagram. It must, however, be borne in mind that, if this condition were not satisfied, much complexity would arise when we combine propositions into syllogisms.

This notation by diagrams pre-supposes that the terms of a proposition are understood in denotation. On the view of the earlier Conceptualists that Logic is concerned with Thought alone and Thought with Concepts alone, such a representation of propositions by diagrams is not allowable. But on the wider view of the science here adopted, such a notation is permissible and is not only helpful to the beginner in realising the full scope of a proposition, but is often found to be an aid even to the expert logician particularly when he deals with a large number of terms, as in the problems of Symbolic Logic.

2. Euler's Scheme.—Leonhard Euler, a Swiss mathematician and logician of the 18th century, devised



a scheme of representing propositions by means of circles. A class being represented by a circle, the possible relations that may exist between any two classes may be represented by the five following diagrams :—



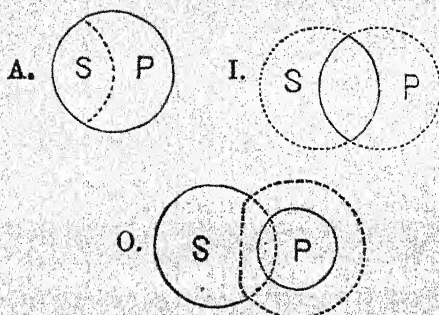
The first of the conditions above enumerated is here eminently fulfilled. It is obvious from each figure what relation is intended between S and P. The relations are, *All S is all P*, *All S is some P*, *Some S is all P*, *Some S is some P*, and *No S is any P*. Thus, 'some' being understood as a definite 'some,' the only five possible relations that are brought out when the predicate is quantified, are most satisfactorily represented by Euler's circles. But owing to the indefiniteness of 'some' in Aristotelian Logic, if we adopt a single figure for each of the propo-

sitional forms, A, E, I and O, we shall not be adequately representing the relations implied, except in the case of E. Therefore, we should represent each by more than one figure except E which is adequately illustrated by two excluding circles. *All S is P* is thus represented by either of the figures (a) and (b), *Some S is P* by either of the figures (a), (b), (c) and (d), *No S is P* by the figure (e), and *Some S is not P* by either of (c), (d) and (e).

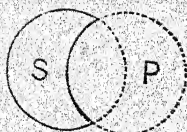
It happens, however, that by this alternative notation a good deal of complexity arises when propositions are combined into syllogisms. The fourth criterion is not thus satisfied. To avoid this complexity apparently, Sir W. Hamilton and Professor Jevons represented A by (b) alone and I and O by (d) alone. This is both misleading and inadequate. Besides, we should have only one figure, a figure of two intersecting circles, for both I and O. An attempt is made to remove this ambiguity by writing the S in the part of the S-circle which is outside the P-circle when the proposition is O, and writing it in the common part when the proposition intended is I. But this does not remove the ambiguity and make the figure self-interpreting since the predication intended can be understood only after the meaning of the position of S is explained. Even when they are successfully differentiated, the representation will be inadequate since the figure for I, for example, will exclude the possibility of S either coinciding with, or including the whole of P.

Now, though it may not be practicable to illustrate a train of reasoning by Eulerian circles since each proposition is adequately represented by a multiplicity of figures instead of one, yet the nature of the knowledge given by each proposition itself is best illustrated only by this multiple representation. "Inasmuch as it shows how limited in some cases this knowledge actually is." It is possible to represent each proposition

by means of a single diagram with the help of dotted lines, and Ueberweg gives the following :—



But the figures are difficult to interpret, and Dr. Keynes points out that the loss in this respect is considerably greater than the gain. In the plate of the last figure which is cumbersome, he suggests the following :—

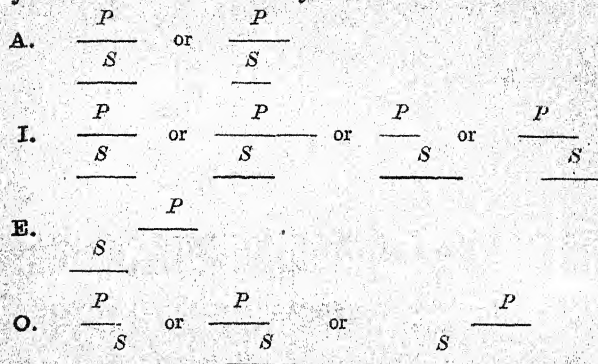


and shows that all the three cases covered by O can be got by (1) filling in the dotted line to the left and striking out the other, (2) filling in both dotted lines, and (3) filling in the dotted line to the right and striking out the other.

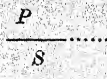
3. Lambert's scheme.—In the place of Euler's circles, Lambert\* employed horizontal straight lines. When two such lines overlap, it means that the two corresponding classes are co-extensive; and when they do not overlap to any extent, the classes are mutually exclusive. Both the absolute and the relative lengths

\* A German philosopher and mathematician of the 18th century.

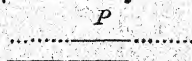
of the lines are arbitrary and immaterial. The lines may be used in the same way as Euler's circles thus:—



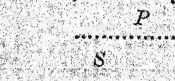
By the use of dotted lines the several cases under each may be represented by a single diagram much more satisfactorily than in Euler's scheme. A is represented by



where the dotted line shows that we are uncertain whether there are more P's than are S's. If the dots are struck out, we get the first figure; if they are filled in, we get the second. I is represented by

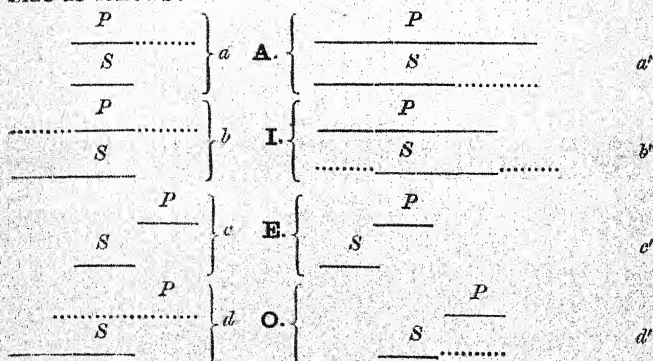


and we get all the four cases by striking out, or filling in, the dots on the right, on the one hand, and those on the left, on the other. E may be represented by two lines wholly out of each other, and O by the following figure:—





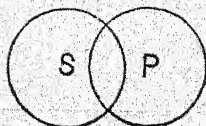
Dr. Keynes points out that another scheme may be constructed in which the P line is not dotted, but some part of S line is dotted. Both the schemes, he says, are necessary in illustrating the syllogism, and gives them side by side as follows:—



I is sometimes represented by both the lines dotted, the undotted parts overlapping each other.

This scheme is not so self-interpreting as Euler's, though it adequately represents all propositions. Providing a single diagram for each proposition, it can, however, illustrate the syllogism in a less cumbersome manner than Euler's circles.

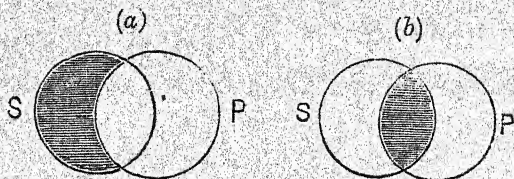
4. Dr. Venn's scheme.—Dr. Venn takes the following diagram:—



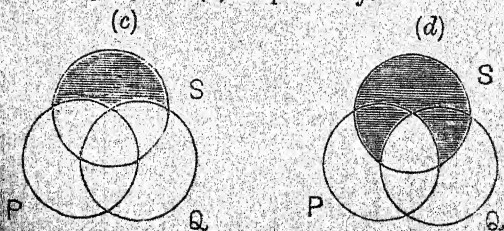
as the framework into which any proposition involving two terms can be fitted. Here, we have four compart.



ments, (1) that which is both  $S$  and  $P$  ( $SP$ ), (2) that which is  $S$  but not  $P$  ( $SP'$ ), (3) that which is  $P$  but not  $S$  ( $S'P$ ), and (4) that which is neither  $P$  nor  $S$  ( $S'P'$ ). Each compartment represents a class, and everything must come under one or other of these four classes. Every universal proposition denies\* the existence of one or more of these classes, and may hence be represented by shading out the corresponding compartment or compartments. Thus,  $A$  may be represented by shading out  $SP'$  and  $E$  by shading out  $SP$ .



His framework into which propositions of three terms can be fitted is a diagram of three circles containing eight compartments. *All S is P or Q*, and *All S is P and Q* are represented by (c) and (d) respectively.



Now, it will be seen that Dr. Venn's scheme is not equally well adapted to represent particular propositions.

\* Dr. Venn's scheme is not based on the view that our terms and their contradictories all represent existing classes, but on the view that particulars are existentially affirmative, while universals are existentially negative.

He suggests that a bar may be drawn across the compartment declared to be saved by a particular proposition; *Some S is P* would thus be represented by drawing a bar across the SP compartment. This, however, is apt to lead to much complexity and confusion in representing combinations of propositions.

## CHAPTER IV.

### THE OPPOSITION OF PROPOSITIONS.

Two propositions with the same subject and the same predicate, but with difference in quality, or in quantity, or in both, are technically said to be opposed to each other. The opposition between A and E is of one kind; that between A and O, or E and I, is of another; that between I and O is of a third; and that between A and I, or E and O (if it may be called opposition), is of a fourth kind. The truth or falsity of one of these propositions affects the truth or falsity of each of the others. If A be true, for instance, E and O must be false. If E be true, O must necessarily be true, and A and I must be false. We shall say more of this further on.

(1) *Contrariety*: A—E.—This is the most thorough-going kind of opposition in respect of quality, and is called the opposition of *Contraries*. 'All men are mortal' and 'No men are mortal' oppose each other to the fullest possible extent. One that advances the latter proposition is contradicted by another, by means of the former, in a manner that renders it impossible for him to deny more. The opponent undertakes to disprove each and every item of his statement. He takes upon himself the greatest

amount of responsibility. His object is not simply to contradict him by showing that he is somewhat wrong in his statement which might, however, be admitted with some qualifications and exceptions, but it is to uphold the other extreme and to show that he is entirely in the wrong, and that quite the reverse of what he urged, is, in reality, the truth. He lays himself open to a grave charge if he fail to disprove one instance.

Of these two propositions, it must be borne in mind that the truth of one of them is inconsistent with the truth of the other. *Both cannot be true, but both may be false.* If one of them be true, the other will be necessarily false. If both be false, then an intermediate statement will be true. 'All men are mortal' being true, 'No men are mortal' is false. 'All men are wise' and 'No men are wise' being both false, 'Some men are wise' is true. Between the two propositions of contrary opposition, there is an intermediate stage.

(2) *Contradiction* : A—O, E—I.—This is an opposition in respect both of quantity and quality combined, but is a less thorough-going one. It is called the opposition of *Contradictories*. A and O contradict each other, and so do E and I. 'All men are rational' is contradicted by the proposition 'Some men are not rational,' and 'No men are wise' by 'Some men are wise.' A may be contradicted by either E or O, and E by either A or I; but I and O can be contradicted only by E and A respectively. A person that wants to refute or overthrow the universal affirmative statement of another, has recourse to the particular negative. It may be possible for him to deny more; but it is not necessary. If, for instance, he undertakes to disprove 'All men are rational' by 'No men are



rational,' he presumes the possession of the greatest amount of knowledge with regard to that fact, and there is a probability of his failing in his object; whereas, if he simply produces a few instances with which he may be acquainted, he places himself in a less dangerous position, and his object in this case may be accomplished with as much effect as it would be if he should succeed in proving the contrary universal. The task in the former case is much greater than that in the latter, but the effect is the same in both cases.

The student who is likely to have felt the difficulty of explaining how the stronger term *contradictory* came to be applied to a feebler kind of opposition, an opposition in which its full force is abated by the change from universal to particular quantity, and the weaker term *contrary* to universal denial, must now be able to solve it. The important fact connected with contradictory opposition, mentioned in the above paragraph, is the clue to the solution of the difficulty. It is the '*sufficiency for disproof*,' as Dr. Bain puts it, that justifies the designation, *contradictory*, to this imperfect opposition. It is the possibility of upsetting a universal statement, by means of a few instances or even one to the contrary. It is the overthrow of a powerful antagonist who chooses to place himself, haughtily enough, on a high but slippery eminence, by means of a small and humble weapon. It is this fact, we repeat, that gives so much importance to the opposition between A and O, or E and I. It is easier to disprove a universal by its contrary particular than by its contrary universal, and yet it is equally effective. This opposition has the advantage of securing great ends by small means. Conversely, O and I are contradicted respectively by A and E.

Regarding this opposition, it is clear from the above explanations that *both of the propositions cannot be true and both cannot be false*. Either 'All men are rational' is true, or 'Some men are not rational' is true, since those men that are alleged to be not rational in the latter proposition are included among all men who are alleged to be rational in the former. Also *if one of them be false, the other must be true*. There is no middle course left, as in the case of contrary propositions. Proving a proposition and disproving its contradictory are one and the same thing, as well as proving the contradictory and disproving the proposition. Euclid establishes the sixth proposition, for instance, by disproving the contradictory. From the truth of '*All S is P*' the falsity of '*Some S is not P*' may be inferred by the Law of Contradiction; *viz.*, *A is not both B and not-B*; and from the falsity of *All S is P* we may infer the truth of *Some S is not P* by the Law of Excluded Middle—*A is either B or not-B*. By the former Law both cannot be true, and by the latter Law both cannot be false. By the former Law, again, contraries cannot both be true, for, if they were, then contradictories would both be true; A and E being given true, A and O (the subaltern of E) must be accepted as true.

In the case of Singular propositions there is no formal contrary, since they cannot differ in quantity. Only contradictory opposition can subsist between them. 'John is late' is contradicted by 'John is not late,' and 'Truth is a virtue' by 'Truth is not a virtue.' The opposition of Singulars has been called Secondary Opposition.

(3) *Sub-contrariety*: I—O.—The contrariety between these two propositions is not a full contrariety, but a partial one. It is of a subordinate character. Hence the

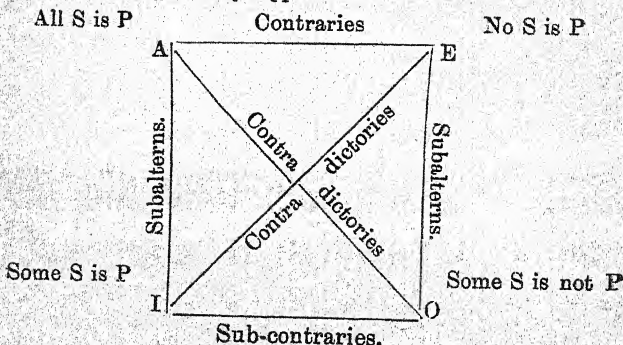


name *sub-contrary* is given to this opposition. The two propositions are quite compatible [with each other, and both can be true at the same time, though both cannot be false. 'Some men are wise,' and 'Some men are not wise,' may both be simultaneously true. It is quite possible that a certain section of the human beings may be wise, and the remaining section may not be wise. But both cannot be false by the Law of Excluded Middle, since no third alternative is possible between 'Some are' and 'Some are not.' Further, when O is sublated or denied, A is affirmed and hence its subaltern I is also affirmed. Hence, only one of these propositions can be false, and the other must be true.

(4) *Subalternation*: A—I, E—O.—The relation between the propositions in each of the two pairs is a relation, not of opposition, but of simple subordination. The one is universal and the other is particular; and the latter is included in the former. When 'All men are mortal' is asserted to be true, it follows that 'Some men are mortal' is also true. This inference depends upon the Law of Identity—A is A. When something is predicated of a whole class, the same thing can be predicated of some portion of that class. The latter may be tacitly assumed when the former is asserted to be true, but not the reverse. The universal may, or may not, be true when the particular is true. Thus, there is no opposition whatever between the propositions A and I, as also between E and O. The relation between them is, however, called *subaltern opposition*, the universal being called *subalternant* or *subalternans*, and the particular being called *subalternate* or *subaltern*. This and the 3rd are given simply to complete the square of opposition which is

usually given in logical treatises to illustrate the various relations discussed in the above paragraphs.

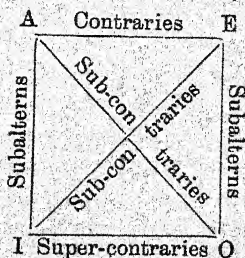
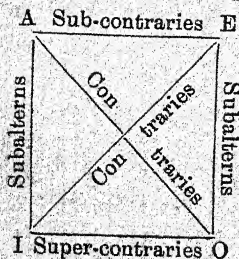
(5) *The squares of Opposition :*



This is the ordinary square. Various logicians give various squares according to the meaning they attach to *contrary* and *contradictory*. DeMorgan, for instance, does not recognise any difference between the two words. His square is as follows :—

DeMorgan's square.

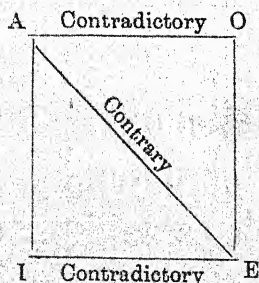
Dr. Bain's amendment on DeMorgan's, founded on common speech.



Dr. Bain, rightly enough, proposes to style the opposition between A and E, *contrary*, and that between A and

O, or E and I, *sub-contrary*, opposition, because the latter is only partial (granting of course, that no distinction based on sufficiency for disproof is recognised between contrary and contradictory).

The following is Aristotle's square :—



Aristotle makes the diameter of the square represent the full contrariety between E and A, as being the longest line fit for the purpose. Besides being the longest, it is also the line which bisects the figure. Dr. Bain says that it is only from this that the phrase *diametrical opposition* arose.

(6) *Inference by Opposition*.—We have alluded in the course of our exposition to the two different points of view from which the doctrine of Opposition can be regarded, namely, as a relation between two *given* propositions, and as a process of inference from the truth or falsity of a given proposition to the truth or falsity of the others with the same subject and predicate. The second point of view is extremely important, and the student must make himself familiar with it. We shall, in the subjoined tables, show what bearings these propositions have upon one another, in respect of their nature as to truth or falsity,

*i.e.*, what propositions will have to be *sublated* or denied when one proposition is *posited* or affirmed, and *vice versa*.

The proposition whose truth is affirmed.	How A is affected.	How E is affected.	How I is affected.	How O is affected.
A (When A is true).	True.	False.	True.	False.
E (When E is true).	False.	True.	False.	True.
I (When I is true).	Doubtful.	False.	True.	Doubtful.
O (When O is true).	False.	Doubtful.	Doubtful.	True.

Again,

The proposition whose falsity is affirmed.	How A is affected.	How I is affected.	How E is affected.	How O is affected.
A (When A is false).	False.	Doubtful.	Doubtful.	True.
E (When E is false).	Doubtful.	True.	False.	Doubtful.
I (When I is false).	False.	False.	True.	True.
O (When O is false).	True.	True.	False.	False.

It will be clear from the above tables that we can draw more definite inferences from the affirmation of the truth of universals than from that of the truth of particulars;



while the affirmation of the *falsity* of universals leaves more cases doubtful than that of the falsity of particulars.

We have no warrant for asserting either the truth of A or that of O, when I is declared to be true. The propositions, 'Some men are wise' and 'Some men are mortal' are true, but 'All men are wise' is false, and 'All men are mortal' is true. When 'Some S is not P' is false, and when 'Some S is P' is true, 'All S is P' must be true and this, the student is reminded, is *not* precluded by the particular affirmative proposition. The logical 'some' does not exclude 'all.' If 'Some S is P' be stated to be incorrect (not false), it may be done so, because 'All S is P' is true, and this latter proposition contradicts, not the former, but 'Some S is not P.'

The doctrine of Opposition can be illustrated by reference to Eulerian diagrams. The opposition of *Contrariety* between A and E is illustrated by the fact that A requires Figs. (a) and (b) and E requires Fig. (e), thus showing that they do not between them exhaust all possible cases since Figs. (c) and (d) are left out. The thorough-going character of their opposition is illustrated by the fact that S which is wholly within P in the Figs. for A is wholly out of it in the Fig. for E. *Contradiction* is illustrated by the fact that each pair of contradictories require between them the whole series of diagrams, and their incompatibility is shown by the fact that no diagram belongs to both of them. *Sub-contrariety* is made clear by the circumstance that I requires (a), (b), (c) and (d) while O requires (c), (d) and (e); that is, two diagrams (c) and (d) are common to them both, which means that they can be true together. They cannot be false together as between them they include all the diagrams. The nature of *subaltern* relation as between A and I becomes manifest by the fact that the Figs. for the former give us all the information given by those for the latter and something more; so that when the universal is



true, the particular is true also. When it is denied, I may still be true, since when the Figs. for A are removed, two others are left to represent I. From this fact also, it is clear that when I is true, A is not necessarily true. The removal of the diagrams for I involves the removal of those for A, which means that when I is false A is false also.

(7) *Opposition of quantified propositions.*—When 'some' is understood as 'some only,' we obtain, as we have seen, five distinctive propositional forms, namely, *All S is all P*, *All S is some P*, *Some S is all P*, *Some S is some P*, and *No S is any P*—U, A, Y, I and E. It will be seen that each of these is inconsistent with each of the others. The truth of I no longer follows from the truth of A. No one of them is the contradictory of any one of the others. The contradictory of U, for example, is expressed by affirming an alternative between Y, A, I and E.

When 'some' is understood in the logical sense, the eight quantified forms are represented as follows by the Eulerian circles :—

U — (a)	E — (e)
A — (a), (b)	$\eta$ — (b), (d), (e)
Y — (a), (c)	O — (c), (d), (e)
I — (a), (b), (c), (d)	$\omega$ — (a), (b), (c), (d), (e)

We see that A and O, Y and  $\eta$ , and E and I, exactly cover all the possible relations, and there is nothing common between them. They are therefore contradictories. The contradictory of U is an alternative between  $\eta$  and O. *All S is all P* is a compound of *All S is P* and *All P is S* and is contradicted by *Either Some S is not P or Some P is not S*. Each of these alternatives does not by itself contradict the original proposition, but *one or other* of both; that is to say, if either of them is true,

the original proposition must be false in its entirety ; and if this proposition is false, one at least of the alternatives must be true. The given proposition and one of the alternatives may both be false, and then the other alternative will be true.

What are the logical opposites of :—

1. No man is free from vanity.
2. Few candidates passed.
3. The whole is greater than its part.
4. Two-thirds of the class are present.

Now, by the *logical opposites* of a proposition we mean the remaining three forms having the same subject and predicate. The first proposition is E. Its opposites are :—

*Contrary* = All men are free from vanity ... .. A.

*Contradictory* = Some men are free from vanity ... I.

*Subaltern* = Some men are not free from vanity ... O.

2. Few candidates passed = Most candidates did not pass ... .. O.

If we recognise most, few, &c., as signs of particular quantity, then we are passing beyond the pale of old logic and trenching on that of what is called numerical logic. Since *most* there means 'at least one more than half,' the contradictory of this proposition would be 'at least one-half the candidates passed' and the contrary 'All passed.'

3. The whole is greater than its part = All wholes are greater than their parts.

*Contrary* = No wholes are greater than their parts.

*Contradictory* = Some wholes are not greater than their parts.

*Subaltern* = Some wholes are greater than their parts.

4. Two-thirds of the class are present. As Dr. Keynes points out with reference to a similar proposition, it may mean either "At least two-thirds of the class are present," or "exactly two-thirds, &c." If the former, the contradictory

is "Less than two-thirds of the class are present" and the contrary "None of the class are present." If the latter, (which is the more correct interpretation) the contradictory is "Either more or less than two-thirds are present" and the contrary "None are present," or "All are present."

Give the logical opposites of the following propositions :—

1. Not a few people were saved.
2. Most of the graduates of this university are Brahmins.
3. All the candidates were present at the examination.
4. The wicked alone deserve punishment.
5. None but the initiated are allowed admission.
- \*6. Socrates is not always wise.
7. The college students except a few, were present at the meeting.
8. A stitch in time saves nine.
9. The candidates sometimes give thoughtless answers.
10. Robert is sometimes brave.
11. He is not brave who shudders at the lion-roar.
12. 'Misery acquaints man with strange bed-fellows.'
13. Some animals are quadrupeds.
14. No men are winged animals.
15. One-half of the class is absent.

\* As remarked in the text a Singular proposition has no formal contrary. 'Socrates is wise' is contradicted by the proposition, 'Socrates is not wise,' but it has no contrary. Some logicians, however, suggest two modes of distinguishing the one from the other, viz., firstly, by adding a few words and taking the material opposite of it, as 'Socrates has not got an iota of wisdom, and secondly, by reckoning Socrates as a man, different on different occasions, and under different circumstances as :—

Socrates is <i>always</i> wise . . . . .	Original.
Socrates is not <i>sometimes</i> wise . . . . .	Contradictory.
Socrates is <i>never</i> wise . . . . .	Contrary.

In the former case, there is no *formal* contrary; and in the latter, as sooner is Socrates recognised in that manner, than the proposition ceases to be singular and becomes general.



16. Few men are rogues.
17. Some animals are not biped.
18. Every effect has a cause.
19. Whatever is, is.
20. It is sometimes necessary for the better relishing of food that one should fast.
21. *He* was not the only criminal that deserved capital punishment.
22. All that glitters is not gold.
23. Ancient buildings are always the strongest.
24. There are no metals that are not elements.
25. It is folly to shut the stable after the horse is stolen.
26. 'Not to know me, argues thyself unknown.'
27. No man is truly happy.
28. Friends in need are friends indeed.
29. Misfortunes do not come single.
30. Nothing contributes so much to a man's happiness as virtuous actions.
31. He who has been bitten by a serpent is afraid of a rope.
32. He who tries to say that which has never been said before him, will probably say that which will never be repeated after him. (Jevons.)
33. I know what I know.
34. The smell of a rose is a mental fact.

Is it the same thing to affirm the falsity of the proposition 'Some birds are predatory,' and to affirm the truth of the proposition 'Some birds are not predatory'? (Jevons.)

Explain the statement that, in the case of sub-contrary propositions, truth may follow from falseness, but falseness cannot follow from truth. (Jevons.)

---

## CHAPTER V.

IMMEDIATE INFERENCE—GREATER TO LESS  
IN DENOTATION AND IN CONNOTATION—  
OBVERSION—CONVERSION, &c.

Inference, from *L. in* and *ferre*, to carry, is the carrying in, or the introduction in a new form of whatever is contained in the antecedent propositions. It is the drawing of one proposition from another proposition or propositions. It is either a deduction or an induction from premises. 'The gathering of clouds forebodes rain' is an inductive inference derived from an observation of the phenomenon on an indefinite number of particular occasions on which it has resulted in the said effect. With this kind of inference, however, we have nothing to do in this little book. It is of the deductive inference that we first proposed to speak. Such inferences are either mediate, or immediate. Mediate inferences are those that are drawn with the assistance of a *medium*, or a third term. Doubting the indestructibility of *gold*, if one is informed that it is matter, then one will, from one's knowledge of matter that it is indestructible, be assured of the fact, that gold is also so. Thus,

All matter is indestructible.

Gold is matter.

∴ Gold is indestructible.

*Matter* is the third term. It is the connecting link between the other two terms. It acts as the mediator, and establishes a relation between them. This process by means of which an inference is drawn from two



propositions through the instrumentality of a third term, is *sylogism proper*, which will be treated of fully in Book IV. It is about immediate inferences that we mean to speak now. Immediate inferences are those that are drawn from known propositions *without* the help of third terms. If from the proposition 'All old men are prudent' we consider ourselves warranted in saying 'No imprudent man is old,' then, we are, in making such a statement, drawing an immediate *inference*. When from 'All Bengalees are active' we draw the inference, 'Some Bengalees are active' we draw an immediate inference. Now the question arises, are these, *inferences*, legitimately so-called? Is the word, *inference*, applicable to these cases? Logicians do not agree with regard to this point. Thomson, for instance, says that, if on the ground of asserting nothing new in the conclusion we refuse the name inference to cases similar to those mentioned above, then we shall have to refuse the name also to syllogisms proper in which, likewise, as we know, nothing new is asserted in the conclusion, which is not found in the premises. Mill and Dr. Bain, however, hold the contrary. They think that an immediate inference is strictly no inference, but an expression in other words of a proposition with slight alterations not affecting its subject-matter. The difference between the original proposition and that which is drawn immediately from it, lies, not in the matter, but in the manner or form. On this view, there is justification for treating of Immediate Inferences under the heading of 'Propositions.' Without entering,

however, into the particulars of the nomenclature, we shall confine ourselves in this section solely to a few forms of immediate inference,\* and begin by introducing the student to the first of these, namely, inferring the same thing of a limited number of objects from a proposition in which it is asserted of the whole.

### I. Immediate Inferences from Categoricals :

(1) *Greater to less in denotation.*—‘Whatever is true of the whole is true also of its parts,’ is a truth perceived by all, and recorded as indisputable. When a man affirming something to be true of a whole species, denies that the same thing is true of a part of it, then, he is inconsistent with himself. If, for instance, he makes a universal statement about all the houses of a particular town, that they are built of granite, and in the same breath denies the fact with reference to some of them, he contradicts himself. If, however, he maintains that some houses *are* built of granite, he is only consistent with himself, but does not deserve any credit for his statement, for he does not make a new one. He only expresses a part of what he already advanced. In fact, what is the whole but an aggregate of its parts. The universal statement owes its existence to its constituent particulars. When these are true, the universal statement is true also, but not otherwise. When the individual houses have been found on examination to be built of granite, one is authorized

---

\* Instead of ‘Immediate Inference,’ Dr. Bain speaks of ‘equivalent propositional forms.’ But it will be seen that in some of the forms of Immediate Inference to be spoken of in the subsequent sections the inferred proposition is not the exact equivalent of the original proposition. The term *eduction* is suggested by Miss Jones and adopted by Mr. Welton.

to advance that universal proposition 'All the houses of the town are built of granite.' Thus then, it is no inference but a simple reiteration to say that such and such house is built of granite. This case of immediate inference is too obvious to require further discussion.

(2) *Greater to less in connotation.*—This case is very much similar to the above, but only refers to connotation. If, after assuming that nightingale is a bird, one denies its possession of wings, then, as before, one is open to the charge of self-contradiction. The very fact that it is a bird implies that it has wings; so that, the affirmation of the latter after assuming the former, cannot be strictly an inference, but a repetition. To say that John is virtuous, is to say that he does not steal, does not utter falsehood, does not commit murder, but does good actions, actions that tend to the good of his fellow-beings; so that, after declaring that John is virtuous, to say that he never steals, is to give no new information, but only a part of what is already known. It is only when one is perfectly satisfied in the case of John, that he possesses all these qualities, that one is justified in calling him a virtuous man.

(3) *Obversion.*—To obvert a proposition is to change the quality of the proposition without changing its meaning. Every proposition has two sides. The affirmation of something implies the denial of its opposite; and the denial of something implies the affirmation of its opposite. The proposition 'John is honest' implies 'John is not dishonest' and 'John is not honest' implies 'John is dishonest.' The former of these follows from the Principle of Contradiction which tells us that if S is P, it cannot also be not-P; and the latter follows from that of

Excluded Middle which tells us that if S is not P, it must be not-P. That is to say, the obversion of affirmative propositions rests on the former principle, and that of negative propositions rests on the latter principle. The original proposition is called the *Obvertend*, and the inferred proposition is called the *Obverse*. It will be observed that the obverse retains the original subject, but has for its predicate the negative of the original predicate; and this becomes a justifiable inference for the reason that the quality of the proposition is also changed. The two are equivalent propositions, and we can indifferently pass from the one to the other.

The name '*Obversion*' is given to this process by Dr. Bain. Other Logicians call it by other names. Fowler calls it *Permutation*, Jevons, *Immediate inference by privative conception*, Ueberweg, *Equipollence*, and De Morgan, *Contraversion*. Obversion is either *formal* or *material*. *Formal obversion* is what we have described above and relates to the form of the proposition without depending on any examination of its subject-matter. It can be applied to the four propositional forms A, E, I, and O.

*The Obversion of A,*

All S is P, all men are mortal, is performed by means of the rule—*First, obvert the predicate, and next, prefix the sign of negation.* To obvert a term is merely to take the negative of it.

All S is not-P, all men are not-mortal.

No S is not-P, no men are not-mortal, i.e., *no men are immortal.*

All S is all P (all men are all risible beings) is obverted in the same way.

All S is all P = No S is not-P.



All men are all risible beings = No men are not-risible beings.

All old men are prudent = No old man is not-prudent.

All matter is indestructible = No matter is not-indestructible or destructible.

All Brahmins are discreet = No Brahmins are not-discreet.

Every lion is a carnivore = No lion is a not-carnivore.

Every metal is an element = No metal is a not-element or compound.\*

\* Obversion, as we have seen, turns upon the principle that two negatives destroy each other. No doubt, in common speech, there is always a shade of difference between the affirmative form and the double negative form, caused by pronunciation. For example, 'Metals are elements,' and 'Metals are not compounds' do not both mean the same thing. Dr. Keynes says that DeMorgan urges the above circumstance as a drawback in Obversion and observes that such distinctions of pronunciation cannot be recognized in Formal Logic.

Again, owing to the negative predicate, the obverse is awkward in form, but is generally reduced to a form in accordance with ordinary speech by the substitution of the material contradictory in the place of the formal contradictory. 'Metals are not not-elements' is written as 'Metals are not compounds.' This is justifiable only when the formal and the material contradictories are exact equivalents. But in other cases, such a substitution is improper. *Not-rich* is not the same as *poor*, as there are people that are neither rich nor poor. *Not-happy* is not equivalent to *unhappy* (which implies positive misery), as a man may be neither happy nor unhappy. Between *agreeable* and *disagreeable* there is an indifferent stage. It may be that the obverse with the material contradictory is inferrible from the obvertend, but it is not its exact equivalent. We cannot pass back from the obverse to the obvertend. In the case of negative propositions, the obverse is not even inferrible from the obvertend. Though we can infer 'Some men are not poor' from 'Some men are rich,' we cannot infer 'Some men are rich' from 'Some men are not poor.'



*The Obversion of I,*

Some S is P, some rulers are just, is performed by the same rule—*obvert the predicate and prefix the sign of negation.* Thus,

Some S is not-P, some rulers are not-just.

Some S is not not-P, some rulers are not not-just.

The obverse of 'Some S is all P' (some rulers form all just men) is also the same. It is 'Some S is not not-P,' 'Some rulers are not not-just.' Similarly,

Some men are wise = some men are not not-wise.

Some books are heavy = some books are not not-heavy.

Some metals are elements = some metals are not compounds.

Some stones are used for building purposes = some stones are not those that are not used for building purposes.

Some men live by labour = some men are not those that do not live by labour.

*The Obversion of E,*

No S is P, no orange is bitter, is performed by the rule—*obvert the predicate and remove the sign of negation.* Thus,

No S is not-P, no orange is not-bitter.

All S is not-P, all oranges are not-bitter, *i.e.*, all oranges belong to the class of not-bitter things.

Similarly,

No rulers are merciful = all rulers are not-merciful.

What is not recognised, is not right = what is not-recognised, is not-right.

Foolish men never prosper = all foolish men are those that do not prosper.

*The Obversion of O,*

Some S is not P, some oranges are not sweet, is performed by the same rule as that for E, namely, *obvert the predicate and remove the sign of negation*. Thus,

Some S is not not-P, some oranges are not not-sweet.

Next removing the negative sign, we have,

Some S is not-P, some oranges are not-sweet, *i.e.*, some oranges belong to the class of things that are *not sweet*.

In the same manner,

Some heavy things do not fall to the ground = some heavy things are things that do not fall to the ground.

Some doctrines are not exoteric = they are esoteric.

*Material Obversion* is the process by which such a change in the proposition is effected as is warranted by an examination of the subject-matter. Material obverse is, in most cases, quite a different proposition from the original. Dr. Bain who treats of the subject at length (see pages 111 and 112) says that from 'Warmth is agreeable' we can, by formal obversion, infer that 'Warmth is not disagreeable nor indifferent' and, by material obversion, say 'Cold is disagreeable.' His reasons for inferring the latter proposition from the original, are as follow:—No one will deny the propriety of the inference 'The absence of warmth is the absence of an agreeable thing.' In order that 'Cold is disagreeable' may be inferrible from this, 'absence of warmth' must be equivalent to 'cold' and 'absence of agreeable' must be equivalent to 'disagreeable.' But these may not be. The two states of 'absence of warmth' and 'absence of agreeable' may be indifferent states; however, the sudden transition from warmth to cold causes positive pain, and

on the faith of this induction, he says, we are justified in drawing that inference. It must be remembered, however, that cold under certain circumstances is as agreeable as warmth under others, and that warmth under certain circumstances is as disagreeable as cold under others. Therefore, apart from the special conditions under which warmth is found to be agreeable, it is doubtful if we can say that 'Cold is disagreeable' is an inference from it. Even when the special conditions exist, as Dr. Bain himself says, an inductive examination of particular cases of transition from warmth to cold is needed before the disagreeable character of cold can be established. Other examples are cited by Dr. Bain as illustrating material obversion; such as, the inference from 'War is productive of evil,' that 'Peace is productive of good,' and the one from 'Knowledge is good' that 'Ignorance is bad.'

Give the obverse of the following propositions :—

1. All the virtuous are happy beings.
2. Some men are always thoughtless.
3. No man is perfect.
4. Some politicians are not just.
5. It is no shame to be taught.
6. A stitch in time saves nine.
7. Men are not always considerate.
8. What is sport to you is death to us.
9. Whatever is, is.
10. No man is a hero to his valet.

(4) *Conversion*.\*

*Conversion is the process by which we infer one proposition from another by transposing the terms.* For example, 'No

---

\* In its popular sense, conversion is simply a change in the position of the terms of a proposition, as when we say "This proposition is true, but its converse is not."



metals are compounds' is converted into 'No compounds are metals.' The former proposition is called the *Convertend*, and the latter, the *Converse*. The truth of the converse follows directly from the truth of the convertend. It must, however, be noted that, except in some defined instances, the simple transposition of the subject and the predicate does not give us an equivalent proposition. The converse of the proposition, 'All men are mortal,' is *not* 'All mortal beings are men,' for, as a matter of fact, we know there are other beings than men, that are mortal. Men form only a part of the mortal beings. Therefore the proper converse would be 'Some mortal beings are men.' But, if the proposition be 'All men are all mortals' which is one of Hamilton's quantified forms (which simplify the processes of conversion to a very great extent) then, mere transposition of the terms will give us an equivalent proposition. But, in Aristotelian Logic, the case is different. The predicate is not quantified, and though the *quality* of the convertend and the converse must be the same as they must both express the same fact and as there must be no difference between them except a difference in the standpoint of predication, yet a change in the *quantity* may be necessitated in passing from the former to the latter. In conversion, the given proposition should be read wholly in denotation, and this involves a consideration of the distribution of the predicate in order that we may not assert more in the converse than we have asserted in the convertend. Valid conversion, or, as it is otherwise termed, *Illative Conversion*, thus necessitates the observance of the following rules:—

- (1) The quality of the convertend must be retained in the converse (Rule of Quality).
- (2) No term must be distributed in the converse

unless it was distributed in the convertend (Rule of Distribution).

*The conversion of A.*—As we have remarked, the process to be employed in converting A, is not that of the simple transposition of the terms, but that of qualifying the predicate, and making it the subject afterwards. It is, '*Conversion by limitation or Conversio per accidens.*' The converse of 'All men are biped' is 'Some biped animals are men.' In the convertend, the subject is distributed, but the predicate is not. This undistributed predicate must become the subject in the converse, and must, in consequence, be qualified by *some*, if the rule of distribution is not to be violated. As for the distributed subject, it must become the predicate in the converse (which is now a particular affirmative proposition in which the predicate is undistributed). This non-distribution of a term in the converse, which is distributed in the convertend is no breach of the rule, as the rule merely enjoins that we should not distribute a term in the converse which was not distributed in the convertend, which is a technical mode of stating that we should not express more in the converse than is implied in the convertend; but the only disadvantage arising from it is, that the whole spirit of the convertend is not brought out in the converse. We lose a part of the information conveyed by the convertend, and by no means of operating upon the converse can we re-ascend to the convertend. 'Some biped animals are men' is the exact equivalent, not of 'All men are biped,' but of its subaltern, 'Some men are biped.' The thing is rendered very easy if we admit Hamilton's quantified form 'Some biped animals are all men' which is the proper converse of 'All men are biped.' Thus, A is converted by limitation, and its converse does



not exactly embody the spirit of the convertend; and hence this is a case only of partial equivalence. Aristotle called this conversion '*partitive conversion*.' Though the necessity for converting A by limitation is obvious from the rules, yet people frequently commit the fallacy of converting it simply. It is often argued, for instance, that because men of merit succeed in life, success in life is an indication of merit. If pious men regularly attend church, regular attendance at church is often taken to be a sign of piety. When the simple converse of A is true in reality as when the subject and predicate are co-extensive, it is not because it is an inference from A, but because there is a special relation between the attributes connoted by the subject and predicate, established by evidence independent of A.

*The conversion of I and E.*—I and E are converted simply, or without any qualification. In 'Some men are wise,' both the terms are undistributed, and therefore they may exchange places without any change of meaning. The converse would be 'Some wise beings are men.' E is converted in the same manner. The converse of 'No men are wise' is 'No wise beings are men.' The student will do well to describe the Eulerian diagrams for the convertend and the converse of both I and E, and compare them.

*The inconvertibility of O.*—SoP does not admit of ordinary conversion, because the converse would also be negative (by Rule I) and S would be distributed in it, being its predicate. But this distribution of S in the converse is prohibited (by Rule II) as it is not distributed in the convertend wherein it is the subject of a particular proposition. 'Some men are not sincere' merely asserts

that the class of sincere beings is to be excluded only from a part of the class of men. But 'Sincere beings are not men' would imply that it ought to be excluded from the whole class of men. The difficulty persists whether we make the subject of the converse, universal, as we are justified in doing since the predicate of the convertend is distributed, or make it only particular.

The student may verify the processes of conversion above described by a reference to Eulerian diagrams. Dr. Keynes gives Aristotle's *indirect* proof of the conversion of E as follows: *No S is P*, therefore, *No P is S*; for, if not, *Some individual P, say Q, is S*; and hence *Q is both S and P*; but this is inconsistent with the original proposition. Having proved the legitimacy of the conversion of E, we can prove the conversion of A thus: *All S is P*, therefore, *Some P is S*; for, if not, *No P is S*, and therefore (by conversion) *No S is P*; but this is inconsistent with the original proposition. The conversion of I may be similarly proved.

In this proof there is nothing but the application of the principles of Contradiction and Excluded Middle; but the proof involves *petitio principii*, because in passing from *Some individual P, say Q, is S*, to *Q is both S and P*, we are assuming the process of conversion, i.e., we say that because P is Q, therefore, Q is P. And it is also difficult to see how we can base conversion on the above principles without resorting to this mode of indirect proof. But, as Dr. Keynes points out, the conversion of each of the four propositional forms can be justified without any explicit reference to those principles by considering with the aid of Eulerian diagrams what relation of P to S will be consistent with all the possible relations contemplated by the original

proposition. The inconvertibility of O is also self-evident, as *Some S is not P* is compatible with every one of the propositions—*All P is S, Some P is S, No P is S, Some P is not S.*

Singular propositions may be converted either simply or by limitation. If the predicate of the singular proposition be a singular term also, then simple conversion will hold. 'Lord Curzon is the present Viceroy of India' may be converted simply, as 'The present Viceroy of India is Lord Curzon.' If it be, on the other hand, a general term, then, if the proposition be negative, it can be converted simply. If the predicate be a general term, and the proposition be affirmative, then conversion *per accidens* must be applied. For example, 'London does not trade' is converted simply, as 'No trading city is London.' But 'The 14th dragoons were defeated' is converted *per accidens*, as 'Some that were defeated, were the 14th dragoons.' In all cases of conversion, the given proposition should first be thrown into the logical form with the subject, the predicate, and the copula, clearly stated; and then conversion should be attempted according to rules. Here are a few examples.

'No man is a hero to his valet.'

There is no difficulty in converting this proposition, because it is universal negative and is hence converted simply, as, 'No hero to his valet is a man.' (There are no heroes to valets among men).

'What is sport to you is death to us.'

We are likely to commit the mistake of supposing that simple conversion should be applied in this case, and say 'What is death to us is sport to you.' There may be other causes of death. The term 'death,' &c., is not distributed.



Therefore, the right converse is 'Something that is death to us is spout to you.'

'John must take care of his money.'

This is equivalent to 'John is a man that must take care of his money.' The predicate is undistributed, and therefore, the proposition must be converted by limitation. Thus, the converse is, 'Some one that must take care of his money is John.' Similarly, the converse of 'John defeated Williams' is 'Some one that defeated Williams is John.'

'A stitch in time saves nine.'

This has the force of a general proposition, and can be rendered logically into 'All stitches in time are things that save nine stitches.' The subject of this proposition is distributed, and the predicate is undistributed, because there may be other means of saving nine stitches. Thus, it is universal affirmative and is hence converted by limitation. The converse is 'Some things that save nine stitches are stitches in time.'

'Every effect has a cause.'

This is a universal affirmative proposition equivalent to 'All effects have causes,' *i.e.*, 'All effects are those (events) that have causes.' Thus, the converse is, 'Some that have causes are effects.'\*

Convert the following propositions :—

1. The better part of valour is discretion.
2. Life every man holds dear.
3. It rains.
4. He jests at scars who never felt a wound.
5. P struck Q.

Jevons studies in Deductive Logic, p. 39-41.

---

\* This is the strict converse; but the fact is, 'All causes have effects.'

6. None but the brave deserve the fair.
7. He can't be wrong whose life is in the right (Keynes).
8. Union is strength.
9. Evil doers are evil dreaders.
10. Mischievous students are not always intelligent.
11. Some soldiers did not break into the ranks of the enemy.
12. Some logicians do not admit the doctrine of the Quantification of the Predicate.
13. The whole is greater than its part.
14. Little strokes fell great oaks.
15. Charity begins at home.

(5) *Obversion of the Converse*.—Obversion and Conversion are two primary processes, by combinations of which we can get other immediate inferences from the given proposition. The converse of A, E or I may be obverted again, and this proposition may be called the obverted converse of the original proposition.

Original proposition.	Converse.	Obverted converse.
All S is P.	Some P is S.	Some P is not not-S.
Some S is P.	Some P is S.	Some P is not not-S.
No S is P.	No P is S.	All P is not-S.

(6) *Contraposition, or Conversion of the Obverse*.—The obverse of each of the propositions A, E, I and O, may be converted again, and the resulting proposition is called the *contrapositive* of the original proposition.



Original proposition.	Obverse.	Contrapositive.
All S is P.	No S is not-P.	No not-P is S.
Some S is P.	Some S is not not-P.	None.
No S is P.	All S is not-P.	Some not-P is S.
Some S is not P.	Some S is not-P.	Some not-P is S.

It will be seen from this table that the contrapositive in each case is a proposition with not-P as the subject; and this is just its definition. *Contraposition is the process by which from a given proposition we infer another having for its subject the negative of the original predicate.* It is also clear from the table that the quantity of the contrapositive is the same as that of the original proposition in the case of *A* and *O*, but it is different in the case of *E*, as the obverse of *E* is *A* and as *A* can only be converted *per accidens*.\* The *quality* of the contrapositive must be different from that of the original proposition, as obversion changes the quality, but conversion does not change it back again. *I* has no contrapositive, as the obverse of *I* is *O* and *O* cannot be converted.

The scientific value of contraposition consists in this, that, when a universal affirmative *All S is P* is established and when it is suspected that its simple converse, *All P*

\* For this reason, the contraposition of *A* and *O* has been called *simple contraposition*, and that of *E* *contraposition per accidens*.

is *S*, may also be true, the easiest method of establishing this proposition is to institute an inquiry about the *not-S*'s and seek to prove that *No not-S is P* which is the contrapositive of *All P is S*.

Contraposition has also been called *Conversion by Negation*, and is said to be the only kind of conversion applicable to *O*. But it is better not to use 'conversion' in this sense, as the subject of such a converse is not the same as the predicate of the given proposition. Dr. Bain calls it *Obverted Conversion* apparently to signify, in conformity with the old notion, that it is a kind of conversion, but only, a conversion applied after the given proposition is obverted.

(7) *Obsversion of the Contrapositive*.—If the contrapositive as above obtained from a given proposition is obverted again, we get an inference which may be called the *obverted contrapositive* of the given proposition. This inference will be found to be of the same quality as the original proposition, and to have for its subject, the negative of the original predicate, and for its predicate, the negative of the original subject.

Original proposition.	Contrapositive.	Obverted Contrapositive.
All <i>S</i> is <i>P</i> .	No not- <i>P</i> is <i>S</i> .	All not- <i>P</i> is not- <i>S</i> .
Some <i>S</i> is <i>P</i> .	None.	None.
No <i>S</i> is <i>P</i> .	Some not- <i>P</i> is <i>S</i> .	Some not- <i>P</i> is not not- <i>S</i> .
Some <i>S</i> is not <i>P</i> .	Some not- <i>P</i> is <i>S</i> .	Some not- <i>P</i> is not not- <i>S</i> .

The name, Contrapositive, is restricted by some writers to this form, probably because they hold with the older logicians that it is a kind of conversion, and, as such, should not change the quality of the given proposition. Both forms are contrapositives according to our definition, but, having recognised obversion as a distinct process of immediate inference, we shall call the first and the simpler form, the Contrapositive, and the second form, the Obverted Contrapositive.

(8) *Inversion*.—From a given proposition with S as subject and P as predicate, we have now obtained all its equivalents with P and not-P as subjects. We shall now see what inferences are obtainable with not-S as subject. If we convert, wherever it is possible, either the obverted contrapositive as obtained in the preceding section, or the obverted converse as obtained in Section 5, we get a proposition with not-S as subject. That is to say, from the original proposition, we must first get a proposition with S as predicate (with P or not-P as its subject), obvert this, and then convert this obverse. Obversion may next be necessary to secure the original predicate. *Inversion, then, may be defined as the process by which from a given proposition we infer another having for its subject the negative of the original subject.* The given proposition is called the *Invertend*, and the inferred proposition is called the *Inverse*. Instead of illustrating this inference by means of a table with the help of the result last reached as in the above cases, we will actually perform the processes of obversion and conversion alternately on the given proposition, and seek to obtain the required inverse. This will involve a repetition of the processes already gone through.



against the motion were Liberals,' it is the connotation of the substantive that is predicated of the subject, and there is absolutely no reference to 'Liberals' as a class of individuals. We intend to bring out by the proposition only the type or character of those that voted against the motion. Two considerations serve to confirm the view that this mode of interpreting propositions is psychologically the most prominent. In the first place, an attributive (an adjective or a participle) can never form the subject of a proposition. It is a substantive in which denotation is more prominent than connotation that is almost always the subject of a proposition, and an attributive in which the connotation is more prominent than denotation that is more often its predicate. Secondly, it is commonly the subject of a proposition that is quantified and not the predicate; and the quantity of the subject (*all* or *some*) can relate only to its denotation as the connotation is always taken in its totality and not distributively applicable.

It must, however, be borne in mind that the predicative mode of interpreting the proposition is neither the most fundamental mode as the denotation of the subject is ultimately determined only by its connotation, nor the most advantageous for logical purposes. Even from a psychological point of view, cases may be mentioned in regard to which reading the subject in denotation and the predicate in connotation sounds unnatural, as in the classificatory sciences; e.g., *All palms are endogens, Hindus are Aryans, &c.*

(2) *The Denotative view:*

(a) *The class-inclusion view.*—The subject and the predicate are both read in denotation, and the proposition

To assert that the class denoted by the subject is to *ded in*, or *excluded from*, the class denoted by the predicate. This mode of interpreting the proposition is highly useful for the purposes of formal logic. Dr. Keynes points out that it lies at the basis of the *diagrammatic illustration* of propositions, of the doctrine of *distribution*, of the doctrine of *conversion*, and of the treatment of the syllogism. In regard to this last, it will be seen that each of the three terms of the syllogism occurs in some of the figures as the subject of one proposition and the predicate of another, so that, if a term that so occurs in any given mood is to be understood in the same sense in that mood, both the subject and the predicate of the propositions composing it must be taken either wholly in denotation or wholly in connotation.

It may be pointed out that this mode of interpretation is not generally what strikes us when a proposition is presented to us for consideration; yet it is not altogether false psychologically. There are propositions, as we have seen, which naturally lend themselves only to this mode of interpretation. In the example, 'All Hindus are Aryans,' the main fact intended is the inclusion of the Hindus in the class of Aryans. Again, this mode is not the most ultimate mode of interpreting propositions, because denotation is in all cases determined only by connotation, and that which proceeds upon connotation can alone be regarded as the fundamental import of propositions.

Mr. Welton's objection to the class interpretation is, that it leads to a five-fold scheme of propositions as five determinate relations are possible between any two classes S and P (*vide* diagrams (a), (b), (c), (d) and (e) Chap. iii),



and that this scheme is hence unsuited to express what is essentially predominant in the Aristotelian scheme, *viz.*, the very common state of doubt when we know that all S is P but do not know whether there are other P's than S's. Dr. Keynes' reply to this contention is decisive and convincing. It is true that the reading of S and P in denotation renders five determinate relations possible between them. But such a reading does not commit us to the necessity of first ascertaining the determinate class relation between S and P before making any statement about them. "It may be added that if a similar view were taken on the adoption of the predicative mode of interpretation, we should have a three-fold, not a four-fold, scheme. For, then, the quantity of our subject at any rate would have to be perfectly determinate, and with S and P for subject and predicate, the three possible statements would be—*All S is P, Some S is P and Some S is not, No S is P.*"

(b) *The Equational view.*—This is a modification of the class-inclusion view, obtained by quantifying the predicate. But we have seen that this view is opposed to common speech or ordinary thought, and has no value as a help to correct thinking or reasoning. It has nevertheless an advantage, *viz.*, that of "enabling us to subject the formulæ to algebraic manipulation."

(3) *The Connotative or Attributive view.*—According to Mill, the final import of a proposition is to be sought in the connotations of the general terms used as subject and predicate. He rejects the class theory of predication as being the result of imperfect analysis, and as involving the assumption that the class-name is the name of a definite number of individuals. The denotation of a general

TH to assert that the class denoted by the subject is to *be included in*, or *excluded from*, the class denoted by the predicate. This mode of interpreting the proposition is highly useful for the purposes of formal logic. Dr. Keynes points out that it lies at the basis of the *diagrammatic illustration* of propositions, of the doctrine of *distribution*, of the doctrine of *conversion*, and of the treatment of the syllogism. In regard to this last, it will be seen that each of the three terms of the syllogism occurs in some of the figures as the subject of one proposition and the predicate of another, so that, if a term that so occurs in any given mood is to be understood in the same sense in that mood, both the subject and the predicate of the propositions composing it must be taken either wholly in denotation or wholly in connotation.

It may be pointed out that this mode of interpretation is not generally what strikes us when a proposition is presented to us for consideration; yet it is not altogether false psychologically. There are propositions, as we have seen, which naturally lend themselves only to this mode of interpretation. In the example, 'All Hindus are Aryans,' the main fact intended is the inclusion of the Hindus in the class of Aryans. Again, this mode is not the most ultimate mode of interpreting propositions, because denotation is in all cases determined only by connotation, and that which proceeds upon connotation can alone be regarded as the fundamental import of propositions.

Mr. Welton's objection to the class interpretation is, that it leads to a five-fold scheme of propositions as five determinate relations are possible between any two classes S and P (*vide* diagrams (a), (b), (c), (d) and (e) Chap. iii),

and that this scheme is hence unsuited to express what is essentially predominant in the Aristotelian scheme, *viz.*, the very common state of doubt when we know that all S is P but do not know whether there are other P's than S's. Dr. Keynes' reply to this contention is decisive and convincing. It is true that the reading of S and P in denotation renders five determinate relations possible between them. But such a reading does not commit us to the necessity of first ascertaining the determinate class relation between S and P before making any statement about them. "It may be added that if a similar view were taken on the adoption of the predicative mode of interpretation, we should have a three-fold, not a four-fold, scheme. For, then, the quantity of our subject at any rate would have to be perfectly determinate, and with S and P for subject and predicate, the three possible statements would be—*All S is P, Some S is P and Some S is not, No S is P.*"

(b) *The Equational view.*—This is a modification of the class-inclusion view, obtained by quantifying the predicate. But we have seen that this view is opposed to common speech or ordinary thought, and has no value as a help to correct thinking or reasoning. It has nevertheless an advantage, *viz.*, that of "enabling us to subject the formulæ to algebraic manipulation."

(3) *The Connotative or Attributive view.*—According to Mill, the final import of a proposition is to be sought in the connotations of the general terms used as subject and predicate. He rejects the class theory of predication as being the result of imperfect analysis, and as involving the assumption that the class-name is the name of a definite number of individuals. The denotation of a general

name is determined by its connotation, so that the meaning *par excellence* of that name is its connotation and not what is only begotten of it. Hence in every proposition, a relation of concomitance or non-concomitance is expressed between two sets of attributes, those connoted by the subject and those connoted by the predicate. 'All men are mortal' means 'The attribute of *mortality* is always found to accompany the attributes of *humanity*.' 'Some men are not wise' means "The attribute of *wisdom* is sometimes found not to accompany the attributes of *humanity*." It must be remembered that in all such interpretations, the attributes connoted by the subject are taken *collectively*, as also those connoted by the predicate. 'All men are mortal' does not mean that any one of the attributes of *humanity* is accompanied by the attribute of *mortality*, but the attributes taken as one whole; and the sign of quantity 'all' does not refer to the attributes of *humanity*, but appears in a separate place in the interpretation as '*always*.' This is more manifest in the case of the particular proposition, as 'Some kings are not just' which means 'All the attributes of *kings* are not sometimes accompanied by the attribute of *justice*.'

It has been objected that connotative reading is impossible because the words *always* and *sometimes* reduce us to denotation at once. Dr. Keynes seems to admit to some extent the force of the objection on the ground that no relation can ever be affirmed between attributes alone independently of the objects to which they belong. It is not denied that such a separation of attributes from their objects is impossible; but this impossibility can in no way support the objection. *Always* and *Sometimes* cannot reduce us to denotation unless we under-



stand by denotation the sum of all the different occasions on which the connection between the attributes may be noticed. In this mode of rendering there is a clear advantage in the case of the universal proposition as the word 'always' brings out prominently the essentially universal character of the connection covering all cases present, past and future, and not involving the assumption that the class is definite.

Mill enumerates five of these generalized relations, *viz.*, *Existence*, *Co-existence*, *Succession*, *Causation* and *Resemblance*, one or other of which is asserted or denied in every proposition. 'Cannibals exist' illustrates mere existence. 'All matter gravitates' illustrates the co-existence of inertia and gravity. 'Edward VII. succeeded Queen Victoria' is a proposition asserting mere succession. 'Prosperity depends upon economy' is a case of causation. 'This pithy style of writing is like Dr. Bain's' illustrates resemblance. Dr. Bain follows Mill in regarding the relation of concomitance between attributes or phenomena as the final import of predication, but differs from him slightly in the specification of the concomitance. The two sets of attributes or phenomena which concomitantly occur may occur either simultaneously (co-existence), or one after the other (succession), or as two facts brought into comparison with each other (equality). He points out the logical value of this view as helping us to lay out the divisions of inductive logic. The distinctions he recognises will be found to lie at the basis of inductive investigation. He does not recognise *Existence* on the ground that no science of Logical Method is based on it, and that all propositions of *Existence* can be resolved into those of *Co-existence* or *Sequence*. *Causation* is only an aspect of *Succession*. But these distinctions are of no avail for syllogistic purposes.



(4) *The Connotative-Denotative view.*—According to this view, the subject is read in connotation and the predicate in denotation. The attributes connoted by the subject are an indication of the presence of an individual belonging to the class denoted by the predicate. This mode of interpretation, though possible, is yet only in very rare cases a natural mode of interpretation. The examples which Dr. Keynes mentions, viz., ‘No plants with opposite leaves are orchids,’ and ‘All that glitters is not gold’ serve to illustrate the naturalness of the view.

(5) *The Comprehensive view.*—Sir W. Hamilton holds that every judgment expresses a two-fold relation, a relation in extension and a relation in intension. The former relation which is one of inclusion of what is denoted by the subject under what is denoted by the predicate, has been already considered along with the further developments arising from the quantification of the predicate. The latter relation is also one of inclusion, but it is the inclusion of the intension of the predicate under the intension of the subject. The extensive aspect of *All S is P* is, that all S is contained under P. From the intensional standpoint, *All S is P* means, that the intension of S contains as a part of itself the intension of P; or, more briefly, the intension of P is a part of the intension of S. This reading of propositions has a meaning only if by *intension* is understood the totality of *all the common attributes* of the class in question. If, however, it is understood to mean *connotation*, i.e., the sum of the distinctive or essential marks alone, then in order that this reading may be correct, the given proposition must be regarded as analytical. For, taking the example, *All men are mortal*, the intensive reading is, ‘Mortality

is part of humanity'; and if *humanity* comprises the essential attributes alone by which the class *man* is distinguished, and if mortality is a part of humanity, we have only to unfold the meaning of humanity to obtain our proposition. Thus, if intension means connotation, all universal affirmative propositions become analytical according to this reading. Hence we take intension to mean *comprehension* or the totality of *all* the common attributes. This makes the reading true in regard to all universal affirmative propositions, but we cannot obtain for the other propositional forms equivalent renderings in comprehension for the simple reason that comprehension is always taken in its totality and not distributively quantified. It cannot be said, for example, that *Some S is P* is equivalent to *the comprehension of S and the comprehension of P partly coincide*, for, this latter fact is quite compatible with the mutual exclusion of S and P, while the former is not. Two classes may be mutually exclusive and may yet have some attributes in common. The brahmin class and the warrior class are mutually exclusive, and yet *fallibility, mortality, &c.*, are common to both classes.

---

## CHAPTER VII.

### EXAMINATION OF THE PRINCIPLES KNOWN AS THE FUNDAMENTAL LAWS OF THOUGHT.

There are certain principles known as the fundamental laws of thought which were once regarded by a comparatively small party as the sufficient foundation of all thought or of all reasoning whatsoever. They are the Law of Identity (*A is A*),

the Law of Contradiction (A cannot both be B and not be B), and the Law of Excluded Middle (A must either be B or not be B). How far, or in what sense, they are sufficient as the basis of all Logic will appear from the sequel. They are not laws in the moral sense of the term, not injunctions which are enforced upon all minds, but principles or uniformities to which all minds *cannot but* conform when their meaning is laid bare and understood. They are necessities of the thinking act, conditions of valid thinking, which all normally constituted minds uniformly obey, or find it impossible to violate. A person may contradict himself without knowing that he does so. He may enounce a belief at one time, and forgetting this belief may enounce another at another time which is really its contradictory. But when he is made to perceive the contradiction, he does not acquiesce in it and persist in the belief of both the propositions. The three principles are merely principles of consistency. The designation, 'Laws of Thought,' as applied to them in the sense that they constitute the basis of all kinds of thought or of reasoning, i.e., that every other principle of reasoning can be educed from them, will be seen from the following exposition of their origin to be a misnomer. While they should be obeyed in the course of any argument or reasoning, they can be said to lie at the foundation more particularly of the Logic of Immediate Consistency. The Logic of Mediate Consistency demands a special principle which can develop itself into a method for regulating its processes. Any attempt to



abolish the distinction between Mediate and Immediate Reasoning and to reduce the Mediate to the Immediate, will be found to involve a *petitio principii*.

Aristotle in his *Metaphysics* lays down as the first principle of demonstration "it is impossible that the same predicate can both belong, and not belong, to the same subject, at the same time, and in the same sense." A man cannot both be happy and not be happy. He may be happy at one time and not be happy at another. He may be happy in one sense and not be happy in another. But when the reference is to the same time, and the same sense of happy, then it is impossible that 'a man can both be happy and not be happy.' This is also expressed as 'contraries cannot exist in the same subject.' Simple as this principle may seem, Aristotle was obliged to lay it down because the subtle dialecticians of the preceding period had by wantonly challenging it caused harm to Dialectic. He acknowledges that the principle is ultimate, *i.e.*, one that cannot be explained by reference to a still more elementary principle. If any person denies it, the only possible way of maintaining it as against him is by reducing him to an absurdity. And in showing how this can be done, Aristotle says you must begin by coming to an agreement about the words used and tying down your disputant to the meanings first settled on. Every word should be used in a definite sense and the disputant should be made to adhere to this sense throughout the discourse. No thought or mutual understanding is possible without this postulate which is nothing but the postulate of Identity.

Words must continue to be accepted in the same sense throughout any particular discourse. Regarding this principle of Identity as the *sine qua non* in a discourse by which the denier of the principle of Contradiction can be reduced to an absurdity, Aristotle plainly puts Identity before Contradiction. Aristotle makes mention of what is now known as the Law of Excluded Middle incidentally in the course of his discussion of Contradiction. While Contradiction asserts that one of two contradictories must be false, Excluded Middle says that one of them must be true. These three principles have been variously expressed and interpreted. We shall now consider some of those expressions and interpretations.

1. The Law or Principle of Identity (Principium Identitatis).—The formula is *A is A*. It has also been expressed, "Whatever is, is" (Jevons); "Every object of thought is conceived as itself" (Mansel); "Conceptions which agree can be united in thought, or affirmed of the same subject at the same time" (Thomson); "*A* which is *B* is *B*" (Ueberweg); "The whole is identical with the sum of its parts" (Hamilton); "What is true in one context is true in another" (Bradley); "Whatever is true in one form of words is true in every other form of words which conveys the same meaning" (Mill); and so on. The formula *A is A* is empty in appearance, and most of the above expressions indicate also how it has been interpreted so as to make it serve some end in Logic. We shall now examine some of these interpretations:—

(1) *A is A* may be interpreted to mean "An object of thought or thing is identical with itself"; and this may



be regarded as a Law of Thought. Now, if this is regarded as a *Law of Thought*, we are confronted by a difficulty. Thought, in the strict sense of the term, begins only when we recognise the likeness of the given object with others. "To keep within the self-identity of the object is to suspend thought." In fact, thought or judgment which is the comparison of one object with another, is a possible and a valid process only when the objects compared are understood as identical objects though they may be referred to under different names conveying the same meaning, or under the same name on different occasions. That words should have the same reference always and for all, or that an object or attribute should be recognised as same in differences in context or expression, is then a pre-supposition in all thought or judgment. This is the true meaning of the principle, and is in perfect accord with the original meaning of the term, identity, and with the spirit of the principle as conceived by its original author. Proper names must be understood to refer always to the same individuals, abstract names to the same attributes or groups of attributes, class names to the same groups of individuals, and other names, such as sitting, writing, &c., to their respective characters. Different names conveying the same meaning should also be understood to have the same objective reference.

(2) Confining his attention to general notions or classes, Sir W. Hamilton presents the principle as an assertion of the identity of a whole and its parts. "A concept is identical with the sum of its characters," or, "Classes are identical with the sum of the individuals composing them." These are certainly assumptions which Logic makes. But they are evidently "statements of the internal constitution of some of the identities (general

concepts or classes) that words represent." *Humanity*, for example, is identical with *rationality*, *corporeity*, &c. But this is merely an analysis of *Humanity* which is itself an identity and must be conceived under those attributes at all times and by all. Mill says that Hamilton adopted this interpretation of identity probably with a view to make it the "principle of all logical affirmation." And he points out that it can in no sense be the ground of such affirmation. *The thinking of a concept through an attribute which is a part of itself* gives a correct account only of the nature of Analytical Judgments. In a Synthetical Judgment, the attribute predicated is not thought as part of the subject-notion, but as independent though co-existing with it. It can thus be the principle of such affirmations only as give no information, and as merely assert that "what is called by a name, is what the name declares it to be."

(3) There is a metaphysical interpretation of Identity. Granting that a certain name denotes the same object in all its applications, it may still be asked, what does the name *essentially* signify? The title 'Identity' is sometimes given to a theory on this point. The object may be regarded as an *identity* apart from all its attributes and running through them. "Every existing object is absolutely identical with itself, and Being is attributable only to what is absolutely identical with itself in the midst of all changes." Another theory on the same point is, "an object is identical with the totality of its attributes" or, "an individual is a conflux of generalities."

2. The Law or Principle of Contradiction (Principium Contradictionis).—The formula is, 'A cannot both be B and not be B.' If it is true that A is B,

it is not true that A is not B ; if it is true that A is not B, it is not true that A is B. If a man is learned, it is not true he is at the same time not learned ; if he is not learned, he is not at the same time learned. He may be learned at one time and may not be learned at another, but he cannot both be learned and not be learned at the same time. The same predicate cannot both be affirmed and denied of the same subject at the same time. This is Aristotle's mode of stating the principle. Ueberweg's mode is nearly the same, *viz.*, "Judgments opposed contradictorily to each other cannot both be true." Bradley says, "Denial and affirmation of the self-same judgment is wholly inadmissible." Hamilton puts it, "What is contradictory is unthinkable." Mansel has, "No object can be thought under contradictory attributes." Kant's statement is slightly different from the foregoing : "To nothing can there belong a predicate which contradicts it." (A is not not-A.)

The contradiction in Kant's statement of the principle is between the subject and the predicate of the same judgment, not between two judgments. Aristotle meant by his principle to indicate the nature and meaning of contradiction, namely, that two contradictories cannot both be true at the same time ; and it is implied here that they can be true at different times or in different senses of the predicate-term used. Kant, following Leibnitz, desired to make contradiction the principle for the truth of analytical judgments in particular ; and, as analytical judgments merely state what is contained in the subject quite independently of time relations, he wanted to make the principle of such judgments also free from all time restrictions. When the subject and the predicate of a negative proposition are contradictories, the proposition is true. As Bradley says, there is no real question of principle involved in such different ways



of stating the axiom. In Kant's example, "An unlearned man is learned" ( $A$  is not- $A$ ), contradiction arises from the fact that 'learned' is attributed to a subject denoted by a term which implicitly contains a judgment which states that the subject is not learned. His proposition thus contains two contradictory judgments, and is hence false; that is to say, 'No unlearned man is learned' is true. It must here be noted that the proposition implicitly contained in the subject should strictly be written as 'The man is unlearned,' so that equivalence can be maintained between Kant's form and Aristotle's, only on the supposition that  $A$  is not  $B$  is the same as  $A$  is not- $B$ . But this transition had already been made by Wolfian Logic; and Kant only made use of it for his own purposes. Kant's form is adopted in most modern logical treatises, as also the form,  $A$  cannot be both  $B$  and not- $B$ .

Sir W. Hamilton regards the Law of Contradiction as the "principle of all logical negation." Mill points out that it cannot be the principle of any negation except the denial that a thing is the contradictory of itself. We have seen that Kant formulated it as the principle for the truth of Analytical Judgments only; that is to say, he declared it as the ground of those negative judgments only which contain as subject and predicate terms signifying contradictory attributes, *e.g.*, 'Man is not four-legged.' Here, 'two-legged' being a part of the connotation of man, the proposition is a denial that a thing is the contradictory of itself. But it cannot be the ground of those negative propositions which contain as their subject and predicate terms which signify quite compatible attributes. It can be the ground, for instance, of the proposition, 'A man is not a horse,' because certain elements in the connotation of 'man' such as 'two-legged' are contradictory of certain elements in the connotation of 'horse' such as, 'four-legged,' though in regard to the

other elements of their connotation there may be compatibility. But it cannot be the ground of propositions like 'A mathematician is not a moralist,' for the two concepts are only different, but not contradictory.

Mill also shows that it is erroneous to suppose that contradiction is the principle of all negative reasoning. It is no doubt the principle of all consistent thinking or reasoning, for the very meaning of valid reasoning in the Logic of Consistency is that it does not involve a contradiction. But it can never be the ground on which the validity of the reasoning process itself can be made to rest; for, though the validity of a given syllogism can be tested by showing that the denial of its conclusion would involve the denial of one of the premises, yet this can only be done by means of another syllogism the validity of which has yet to be proved. Mill's own interpretation of the principle is:—"The affirmation of something and the denial of its contradictory are logical equivalents, which it is allowable and indispensable to make use of as mutually convertible."

3. The Law or Principle of Excluded Middle (*Principium Exclusi Tertii*).—This principle is only the other half of the principle of Contradiction. While contradiction fixes the meaning of negation by declaring that of two contradictory propositions one must be false, Excluded Middle interprets that meaning more fully by declaring that one of such propositions must be true. In other words, by the law of Contradiction a proposition cannot be both true and false; by the law of Excluded Middle it must be either true or false. The ordinary formula of Excluded Middle is, *A is either B or not-B.* This we see differs from *A either is, or is not, B.* The negation is transferred to the predicate, as in the case of



the formula for contradiction, and of two contradictorily opposed predicates, it is said that one must belong to every conceivable subject A. If we deny that one of such predicates belongs to a given subject, we must perforce affirm that the other predicate belongs to it. If we deny, for instance, that a paper is white, we must affirm that it is not-white in the same relation. There is no middle possibility. Hence the principle of Excluded Middle does not hold good of contrary terms. If we deny that a person is rich, we cannot affirm that he is poor, as he may be neither rich nor poor, but in indifferent circumstances.

According to Sir W. Hamilton, the principle of Excluded Middle is the principle of all disjunctive judgments. But it is clear that it cannot be the principle of any disjunctive judgments but those in which an alternative predication is made of two predicates each of which is the contradictory of the other, *e.g.*, this number is either odd or even. It cannot be the ground of the disjunctive judgment of the form, 'Either A is B or C is D.' Sir W. Hamilton apparently confines the name of Disjunctive Judgments to those in which the alternative propositions have the same subject. Even when we understand Disjunctive Judgment in this restricted sense for which, however, there is no warrant, it is difficult to see how Excluded Middle can be the principle of such disjunctive judgments as *A is either B or C* where the alternative predicates are positive, and not contradictory of each other. After making this criticism on Hamilton's view, Mill gives his own interpretation of the principle thus: "It is allowable to substitute for the denial of either of two contradictory propositions the assertion of the other."

These three principles constitute the ground of Immediate Inference. Syllogistic Logic and Induction require other vouchers, though these principles should also be conformed to in their reasonings. Hamilton mentions as a necessary postulate of Logic, "that we be allowed to state explicitly in language all that is implicitly contained in the thought." We have seen what consequences have been developed by Hamilton out of this postulate, and how far they could be admitted in Logic. But the postulate itself is very important though Hamilton misapplies it in deriving his improvements, and needs to be carefully borne in mind. It gives us the liberty to express explicitly what the language employed really means though it does not declare it explicitly. But Hamilton's statement of the Postulate would include the process of *inferring* a proposition from another, though the words of the latter do not mean the former. Now, if the Postulate means what we have said, *viz.*, that we possess the privilege of stating in plain language what is only implicitly contained in any given assertion, then Mill points out that it is only a case of the Principle of Identity as understood by him.

---





## BOOK IV. THE SYLLOGISM.

---

### CHAPTER I.

*AXIOM OF THE SYLLOGISM—DIFFERENT WAYS OF  
STATING IT—ITS GROUND—THE SYLLOGISTIC RULES  
AND THEIR RELATION TO THE AXIOM.*

I. General Character of the Syllogism.—In the two foregoing books, we ascertained the nature of the elements of Deductive Reasoning, as also the various transformations which they undergo. It remains for us now to deal with the Deductive Reasoning itself (*i.e.*, reasoning from the general to the particular) which consists in establishing the truth of a proposition with the aid of a more general one. To prove, for instance, that 'Kings are mortal,' we must fall back on the more general proposition (which we know to be true) that 'All men are mortal.' We draw the inference at once from our knowledge of the fact that 'Kings are men.' Every argument consists of two parts, the thesis to be proved, called by the old logicians the *statement* or the *question*, and the propositions brought forward to prove it, called by them the *reason*. When the statement follows the reason, *i.e.*, when it is proved, it is called the conclusion, and the propositions advanced as constituting the

reason or proof, are called the premises. Deductive Reasoning thus expressed 'at full length and in its regular form' is called *Syllogism*.

Premises ... { (a) All men are mortal.  
                               (b) All kings are men.  
 Conclusion     ∴ All kings are mortal.

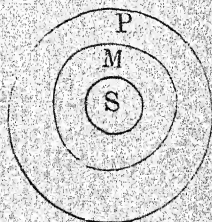
A proposition more general than the conclusion must always be present in a syllogism. Without it, there is no deductive reasoning. It is called the ground proposition (called by Hamilton, the *Sumption*), because it is the ground or basis on which we rest our conclusion. In the foregoing syllogism, (a) is the ground proposition, (b) is the applying proposition (called by Hamilton, the *Subsumption*), i.e., the intermediate proposition through which we see if the particular case on hand can be brought under the more general law; and (c) is the conclusion. A syllogism thus contains three and only three propositions.

Each of these propositions is a conjunction or disjunction of two notions which are expressed by terms; and thus, in a proposition two terms are brought together. *Men* and *mortal* are brought together in (a), *kings* and *men* in (b), and *kings* and *mortal* in (c). Therefore a syllogism which contains three propositions, must contain six terms. But then, the same term occurring twice in the syllogism, this latter is said to contain three and only three terms. These are, the subject of the conclusion, called the *Minor term*, its predicate, called the *Major term*, and another which occurs in both the premises, which is the medium for bringing together the major and the minor terms in the con-



clusion, and which is called the *Middle term*. So that, if, in a syllogism, we want to find out the minor term, we seek for it in the subject of the conclusion, the major in its predicate, and the middle in the term occurring in both the premises. Accordingly, in the above syllogism, *kings* is the minor term, *mortal* is the major, and *men* is the middle term. The minor term derives its name from the fact that it is the smallest in extent, the major term from the fact that it is the largest, and the middle term from the fact that it is wider than the minor term and narrower than the major term. But does this hold true in all syllogisms? No. The designations, *Minor*, *Major*, and *Middle* have resulted specially from the consideration of what has been regarded as the typical syllogism in which all the three propositions are universal affirmatives, as illustrated by the following. A convenient and expressive notation is generally used to mark the positions of the terms in a syllogism.

All M is P.  
All S is M.  
∴ All S is P.

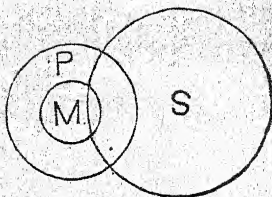


This diagrammatic representation excludes the somewhat rare case in which the terms of a proposition are co-extensive.

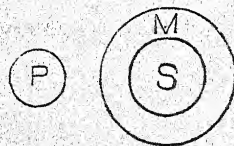
P (Predicate of the conclusion), the major term, appears in the conclusion and in one of the premises ;

S (Subject of the conclusion), the minor, appears in the conclusion and in one of the premises; and M, the middle term, appears in both the premises. The same relation in extent need not hold between the terms in other cases when one of the premises is particular or negative, as illustrated by the following diagrammatic representations :—

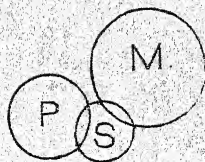
All M is P.  
Some S is M.  
∴ Some S is P.



No M is P.  
All S is M.  
∴ No S is P.



No M is P.  
Some S is M.  
∴ Some S is not P.



The circle, S, may not cut P at all. We observe that, in all these examples, two features strike us, namely, the presence of a proposition more general than the conclusion, and that of a middle term. Further, the conclusion in all these cases inevitably follows from the premises. All valid arguments, how-

ever irregular in form, may be thrown into one or other of the four aforesaid forms. We shall say more of this further on.

It must be noted that the designation 'Middle Term' is pre-eminently appropriate in another sense, as already hinted, that by its means the relation between the major and the minor terms is determined. As regards the premises of a syllogism, the premise containing the major term in which the major and the middle are compared is called the *major* premise, and that containing the minor term in which the minor and the middle are compared is called the *minor premise*. It is usual to state the major premise first and the conclusion last, as the major premise of the typical syllogism furnishes the general principle whose application to a particular case constitutes the essence of deductive reasoning. But the order of the premises will in no way affect the validity of a syllogism, though it may sometimes be advantageously attended to for rhetorical effect.

2. Axiom of the syllogism and the different ways of stating it.—Aristotle's "*Dictum de omni et nullo*" (= statement concerning all and none) is supposed to be the fundamental basis of the syllogistic theory.

"*Whatever is affirmed or denied of a class, is affirmed or denied of any part of that class.*"

This means that, if mortality, for instance, can be affirmed or denied of all men, it can be affirmed or denied also of some men, or of one man. If the dictum

is to have any real meaning at all, it must be taken as being in conformity with the realistic theory of general names, that the class is an 'entity per se' distinct from the individuals composing it. But the class is nothing but the individuals composing it. The class and the individuals forming the class are not two distinct things, but one and the same thing; so that, when from 'All men are mortal,' we infer that 'Some men are mortal,' it is a case of immediate inference. The dictum, then, is simply an enunciation of immediate inference. Syllogism is, surely, more than this. It requires a minor proposition. We cannot infer from 'All men are mortal' that 'John is mortal,' unless we know John to be a man.

Again, the dictum assumes that predication consists in referring something to a class. Though this is a correct theory of predication from the point of view of formal logic, yet it is neither complete nor fundamental, since it ignores connotation. Dr. Bain, however, understands class in the sense of class *indefinite* as fixed by the connotation of the class name, and so, does not regard this as a serious objection to the dictum. He enunciates the dictum thus:—

*"Whatever is true of a whole class (class indefinite, fixed by connotation), is true of whatever thing can be affirmed to come under or belong to the class (as ascertained by connotation)."*

It may also be stated as follows:—

*"Whatever is distributively predicated, whether affirmatively or negatively, of any class, may be predicated,*



*in like manner, of whatever can be asserted to belong to that class."*

In both these modes of stating the axiom, it will be seen that two forms, one for affirmative reasoning and the other for negative reasoning, are included in one expression.

Other logicians that proceed on the connotative view of propositions adopt an expression of the dictum which brings out that view prominently. Mill adopts such an expression and it runs as follows:—

*'Attributes or Things, co-existing with the same Attributes or Things, co-exist with one another.'* (Affirmative).

*'One thing co-existing with a second thing, with which second thing, a third thing does not co-exist, is not co-existent with that third thing.'* (Negative).

The following are practical forms of the same axioms:—

*'Nota notæ est nota rei ipsius.'*—Things agreeing with a third thing, agree among themselves. (Affirmative.)

*'Repugnans notæ, repugnat rei ipsi.'*—Things of which the one agrees, and the other does not agree, with a third thing, do not agree among themselves. (Negative.)

The two latter forms are brought under one general expression thus: "Whatever has any mark, has that which it is a mark of." When both the premises are universal, the axiom is stated thus: "Whatever is a mark of any mark, is a mark of that which this last is a mark of."

Dr. Bain says that Mill's axiom, while it possesses the advantage of bringing into prominence the fact of *mediation* in deductive reasoning, as also that of following out the connotative theory of propositions, is yet "unworkable as a basis of the syllogism. The fatal defect consists in this, that



it is ill-adapted to bring out the difference between *total* and *partial* coincidence of terms, the observation of which is the essential precaution in syllogising correctly. If all the terms were co-extensive, the axiom would flow on admirably; A carries B, all B and none but B; B carries C in the same manner; whence A carries C without limitation or reserve. But in point of fact, we know that while A carries B, other things carry B also; whence a process of limitation is required, in transferring A to C through B.....The axiom provides no means of making this limitation."

Mill's reply is, that it is not likely that anybody would commit the mistake of supposing that, because A carries B, therefore, B carries A also; even if anybody is so incautious, the earliest lesson on the logic of inference, the Conversion of Propositions, will correct it. He says that though his first form of the axiom may in some degree be open to that criticism, his second form, *Nota notæ*, is not. No one would suppose that, because A is a mark of B, B can never exist without A; that, because, westerly winds are a sign of cholera, cholera can never make its appearance except when westerly winds occur.

Mill next notices Dr. Bain's objection that "the axiom does not accommodate itself to the type of Deductive Reasoning, as contrasted with Induction—the application of a general principle to a special case." He remarks that many valid syllogistic reasonings are not applications of general principles to special cases, and that even when Deduction is limited to such reasonings, while the *Dictum* has the merit of making prominent that fact, *viz.*, the application of a general principle to a special case, his own *Nota notæ* has the merit of making prominent "the condition which alone makes that application a real inference." He acknowledges the *Dictum* as the axiom of Formal Deduction, but regards his own *Nota notæ* as the "proper axiom for the logic of the pursuit of truth by way of Deduction," *i.e.*, as the axiom for Real Deduction.

*Sir W. Hamilton's forms:—*

Sir W. Hamilton mentions two forms, one for what he

calls Informal Reasoning or the Unfigured Syllogism, and the other for the Figured Syllogism. The first is the axiom that holds for reasonings independently of the positions of the terms in the premises. It runs as follows:—*In so far as two notions (notions proper or individuals) either both agree, or one agreeing the other does not, with a common third notion; in so far, these notions do or do not agree with one another.* Like the *Nota notæ*, this is also an expression from the point of view of connotation, and does not explicitly provide for distinguishing total from partial agreement. His form for the Figured Syllogism runs thus:—*What worse relation of subject and predicate subsists between either of two terms and a common third term, with which one, at least, is positively related; that relation subsists between the terms themselves.* This means that, if there be a negative in the premises, the conclusion will be negative, and if there be a particular premise, the conclusion will be particular. It will be seen that this is nothing but a combination of one of the special canons of the syllogism and a corollary. It is, however, given in extension, and is in conformity with the dictum, though not so general and significant of the essence of deductive reasoning.

*Thomson's form:—*

*The agreement or disagreement of one conception with another, is ascertained by a third conception, inasmuch as this, wholly or by the same part, agrees with both, or with only one of the conceptions to be compared.* This form resembles the *Nota notæ*, but provides for distinguishing total from partial agreement. Dr. Bain says that, owing to the ambiguity of the phraseology, conception, &c., the axiom may be understood as given either in

extension, or in comprehension. If taken in extension, it closely resembles Hamilton's second form. If taken in comprehension, it closely resembles his first form, and suggests his syllogisms in comprehension.

It is no doubt true that all propositions are ultimately based on the connection of attributes; but reasonings in practice are conceived only on the basis of extension, and if Logic is to conform to practice, its processes must also be conceived on the basis of extension. Hence the Syllogism as well as Terms and Propositions must be conceived only in extension, but all the time it must be distinctly borne in mind that this extension is determined only by connotation. "This double point of view," says Dr. Bain, "complies with all the exigencies of reasoning, and is not advantageously surrendered in favour of the statement of propositions in pure comprehension."

*De Morgan's form :—*

In De Morgan's comprehensive Logic, the syllogism is the composition of two relations into one; and its axiom is '*the relation of a relation is a relation compounded of the two.*' This is a generalisation of many special axioms, such as, the '*Dictum,*' 'Equal of equal is equal,' 'Greater of greater is still greater,' &c.

We may perhaps notice here the attempt made by some to base the syllogism on the so-called Laws of Thought, without the need of a synthetic principle (the *Dictum*) implying the fact of mediation. In the syllogism,

All rabbits are herbivorous.

This animal is a rabbit.

∴ This animal is herbivorous.

it is argued that, having once identified *this animal* with the



*rabbit*, we know that this animal is herbivorous merely from the Law of Identity. All rabbits being herbivorous, this animal is, of course, also herbivorous. What is true in one form of words is also true in another form. It is a case of mere subalternation. Similarly, Negative Syllogisms may be derived from the Law of Contradiction.

Now, in the above reasoning, the process of identifying *this animal* with the *rabbit kind* is not reckoned as a part of the reasoning, and hence arises the possibility of exhibiting it as a case of subalternation. But, as a matter of fact, that this animal is a rabbit is a distinct piece of knowledge that can be arrived at only by material examination, and, without this knowledge, the conclusion, 'this animal is herbivorous,' is impossible. Hence it is the most important step in the reasoning. If, however, the proposition is verbal, the meaning of the predicate being implied in the meaning of the subject, then we may say it is merely a case of Immediate Inference as in the following:—

All those animals that chew the cud can be domesticated.

Ruminant animals chew the cud.

∴ Ruminant animals can be domesticated.

This does not involve real mediation. The character is not altered when the major premise is verbal instead of the minor.

3. Its ground.—The axiom of the syllogism, the essential element of which is the fact of mediation, rests on uncontradicted experience as its proof. Some philosophers also refer it to intuition. It is not, however, a mere principle of consistency like the so-called Laws of Thought, ultimate and requiring no proof. The fact of mediation is its essential feature, and this has to be justified by an appeal to the facts. It must be held to rest on the same foundation as the

mathematical axiom of equality. 'Equals of equal are equal' is an axiom of whose truth we become certain only after actual observation and trial from the earliest years.

4. (a) The syllogistic rules:—

1. *Every syllogism must contain three and only three terms.*

An argument containing four terms may be valid, but it is not a syllogism.

*John is taller than James.*

*Robert is taller than John.*

*∴ Robert is taller than James.*

2. *Every syllogism must contain three and only three propositions.*

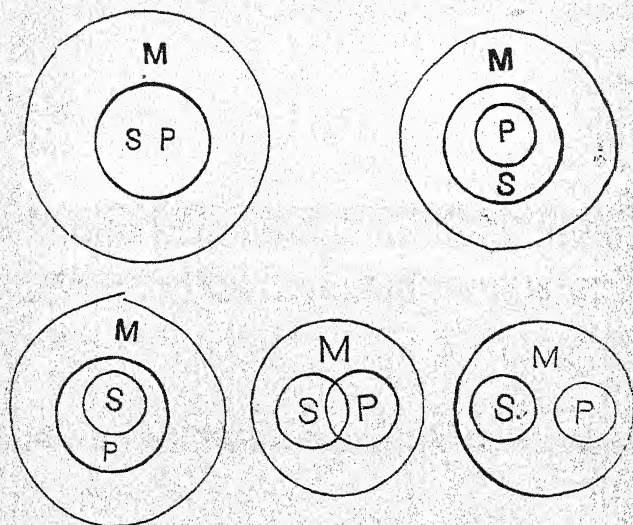
These are, as we have already seen, the major and the minor premises, and the conclusion. The major premise is always stated first, the minor next, and the conclusion last; but in public speeches and orations and even in ordinary conversation, this is not strictly adhered to.

3. *The Middle term must be distributed once at least, and must not be ambiguous.*

If the middle term be not distributed in any one of the premises, *i.e.*, taken in its whole extent, then, no relation can be established between the major and the minor terms; for, the major may have been compared with one part of the middle term in the major premise, and the minor with another part of it in the minor premise. A reference to the Eulerian diagrams will show that all the



five possible relations between S and P are consistent with the two premises, *All P is M* and *All S is M*.



The two premises may be, *All kings are men* and *All subjects are men*, and the conclusion, *No subjects are kings*, is compatible with them; or, they may be, *All subjects are men* and *All philosophers are men*, and the conclusion, *All philosophers are subjects*, is compatible with them; and so on. Thus, conclusions of different quality are found to be compatible with premises which are of the same type; and this absurdity is due to the middle term not being distributed in the premises. Hence no conclusion can be drawn from two such premises. Similar ambiguity will be found to follow from all other cases also in which the middle term is undistributed. Again, though it may be distributed in both the premises, it is enough if it is

distributed in one; for, the relation between every part of the middle term and one term being known, the relation between that term and the other term is known also, so long as this other term coincides with a part at least of the middle term. The real mediation is through that part of it, with which the other two terms coincide wholly or in part.

Again, the middle term must not be ambiguous; for then, it is equivalent to two terms which, with the major and the minor, make four terms (violation of R. I.). No term, in fact, of the Syllogism should be used ambiguously. Since the conclusion should state only what the premises justify, it should speak only of that *same P* which was connected in the major premise with *M*, and of that *same S* which was connected in the minor with the same *M*.

4. *No term must be distributed in the conclusion, which was not distributed in the premises.*

No term must be used in its whole extent in the conclusion, if it was not so used in the premises. Some men are rogues and no rogues are to be trusted, and therefore, no men are to be trusted. Here, the minor term is distributed in the conclusion, whereas it is not distributed in the minor premise. The minor premise states only that *some men* are rogues, and hence we have no warrant for transferring the predicate of *untrustworthiness* to *all men* through the middle term *rogues*. This fallacy is called an *Illicit process of the minor (illicit minor)*. The proper inference is 'Some men are not to be trusted.' Similarly in the argument,—All Christians are to be trusted, and since many people are not Christians, many people are not to be trusted,—the major term is improperly treated (*illicit*

*process of the major, or illicit major*). The major premise A does not distribute its predicate, whereas the conclusion O does. In fact, this fallacy can occur only in those cases in which the conclusion is negative, for only negatives distribute their predicates. In practice, this fallacy is more often committed than the fallacy of illicit minor. It may be that the conclusion of the syllogism involving illicit major is absolutely true, but it is not a conclusion justified by the premises. It must be remembered, however, that, if a term is distributed in the premises, there is nothing wrong in using it in its partial extent in the conclusion.

5. *From two negative premises, no conclusion can be drawn.*

The truth of this rule is obvious from the circumstance that an inference about the relation of two things is not possible, if the premises upon which the inference has to be based state that each of the things is excluded from a third thing (*vide* the various forms of the fundamental canon). The premises 'No M is P' and 'No S is M' do not warrant any inference. The two premises are compatible with all the five possible relations between S and P, as may be easily illustrated by means of the Eulerian diagrams. It may happen that a proposition alleged to be the conclusion from two negative premises is true in fact, but it does not follow from this that it is a valid inference from the premises. In the case in which one of the negative premises is particular, it will be seen on Euler's diagrams that there are seven more combinations of premises besides the five that are necessary for two universals; and all these twelve combinations yield the same five possible relations between S and P, so that the



same indefiniteness exists in this case also as regards the establishment of a relation between S and P. The number of combinations of premises is still further increased in the case of two particular negatives. We thus see that both the premises cannot be negative.

The applying proposition must always be affirmative. 'The subsumption must, in quality, be affirmative' (Hamilton).

6. *If one premise is negative, the conclusion must be negative; and conversely, to prove a negative conclusion one of the premises must be negative.*

The negative premise imports the disagreement of one of the terms with the middle term, and the affirmative premise imports the agreement of the other term with the middle term. But two terms holding contradictory relations to the same term cannot agree with each other. Hence the conclusion must be negative. If one term agrees with the middle term wholly or in part, then to the extent to which it agrees with it, it must disagree with everything else that is excluded from it. Conversely, the disagreement of the two terms in the conclusion can only be due to the disagreement of one of them with the middle term; for if they *both* agree with the middle term, they must agree with each other.

(b) *The Simplification of the Syllogistic rules.*—The first two of the above rules are rather a description of the nature of the syllogism than rules for testing its validity. The second part of Rule 3 is contained in Rule 1, since if any term be ambiguous there will really be four terms. There are thus left *four* rules restated below, two of quantity (3 and 4),

and two of quality (5 and 6), by the application of which the validity of syllogistic inferences can be tested. They are :—

(3) The middle term must be distributed, once at least, in the premises.

(4) No term should be distributed in the conclusion which was not distributed in the premises.

(5) From two negative premises nothing can be inferred.

(6) If one premise is negative, the conclusion must be negative ; and to prove a negative conclusion, one of the premises must be negative.

These four rules are not independent of one another, some of them being deducible from others, and some being mutually inferrible. This has been worked out by Dr. Keynes in his *Formal Logic*, and much of what follows is taken from that work.

i. *Rule 5 is deducible from Rule 3.*

Dr. Keynes gives De Morgan's proof as follows :—  
Taking two universal negative premises, we shall find that, in whatever form they may be, we can reduce them by conversion to

No P is M,  
No S is M.

When these two are obverted, we get

All P is not-M,  
All S is not-M,

which show undistributed middle. If anything can be inferred from the first set of premises, it must also be inferrible from the second set. It may perhaps be objected



to this mode of proof, that if *M* is the subject of both the universal negatives, obversion of both will give us the forms, *All M is not-P* and *All M is not-S*, which do not show undistributed middle. But then, this distributed middle term does not establish any relation between *S* and *P*, but between not-*S* and not-*P*.

The two negative premises may be, one universal, and the other particular. In this case, the same proof as for two universals holds when *M* is the predicate of the particular premise. But when it is the subject, as *O* cannot be converted, De Morgan first obverts and then converts it, so that the two premises are reduced to

All <i>P</i> is not- <i>M</i> ,	or	Some not- <i>P</i> is <i>M</i> ,
Some not- <i>S</i> is <i>M</i> ,		All <i>S</i> is not- <i>M</i> ,

which contain no middle term. It must be noted that even when we retain the original statement of the particular premise without subjecting it to obversion and conversion, there will be four terms as shown below:—

All <i>P</i> is not- <i>M</i> ,	or	Some <i>M</i> is not <i>P</i> .
Some <i>M</i> is not <i>S</i> .		All <i>S</i> is not- <i>M</i> .

When both the premises are particular negatives, we can exhibit undistributed middle by obverting both when *M* is the predicate of both; and when *M* is the subject of both, though we can exhibit the same fallacy by contraposing both the premises, yet the fact must be noted, that in that contraposed form, the terms that are compared with the different parts of the middle term are not *S* and *P*, but not-*S* and not-*P*. When *M* is subject of one premise and predicate of the other, by obverting the one in which it is the predicate, we can show four terms.

Dr. Keynes says that proof of invalidity by reduction to four terms is not satisfactory, "since we may often exhibit a valid syllogism in such a form that there appear to be four terms; e.g., *All M is P, All S is M*, may be reduced to *All M is P*, and *No S is not-M*, and there is now no middle term" (pp. 246-7). But he suggests that such cases may be disposed of by saying that "if we cannot infer anything from two negative premises both of which are universal, *à fortiori* we cannot from two negative premises one of which is particular."

- ii. *The first part of Rule 6 can be deduced from Rule 5, and vice versa.*

"If two propositions P and Q together prove a third R, it is plain that P and the denial of R prove the denial of Q. For P and Q cannot be true together without R. Now, if possible, let P (a negative) and Q (an affirmative) prove R (an affirmative). Then P (a negative) and the denial of R (a negative) prove the denial of Q. But by hypothesis two negatives prove nothing." (Keynes' Formal Logic, p. 247). Dr. Keynes says that this proof was suggested to him by De Morgan's deduction of the 2nd corollary from the 1st. By the same method of proof the second can be deduced from the first.

- iii. *Rule 4 can be deduced from Rule 3, and vice versa.*

"Let P and Q be the premises and R the conclusion of a syllogism involving illicit major or minor, a term X which is undistributed in P being distributed in R. Then the contradictory of R combined with P must prove the contradictory of Q. But any term distributed in a proposition is undistributed in its contradictory. X is therefore undistributed in the contradictory of R, and by hypothesis it is undistributed in P. But X is the

middle term of the new syllogism, which is therefore guilty of the fallacy of undistributed middle." (Keynes' Formal Logic, pp. 247-8). Thus, a fallacy of illicit major or minor is indirectly a fallacy of undistributed middle.

Adopting a similar line of argument, we can deduce Rule 3 from Rule 4. Take a syllogism involving undistributed middle. Let P and Q be its premises, R its conclusion, and X its undistributed middle term. Then P together with the contradictory of R must prove the contradictory of Q. For P and Q cannot be true together without R. But any term undistributed in a proposition is distributed in its contradictory. Therefore X is distributed in the contradictory of Q which is the conclusion of the new syllogism; and it is not distributed in P, by hypothesis. Hence the new syllogism involves the fallacy of illicit process.

Thus, the first part of Rule 6 being deducible from Rule 5, Rule 5 being deducible in its turn from Rule 3, Rules 3 and 4 being deducible from each other, we are left with Rule 3 or Rule 4, and the second part of Rule 6, as the two independent rules:—

(a) The middle term must be distributed, once at least, in the premises. Or,

No term must be distributed in the conclusion which was not distributed in the premises. (Rule of quantity).

(b) To prove a negative conclusion, one of the premises must be negative. (Rule of quality).

It should, however, be noted that this reduction is not of much practical use, as every invalid syllogistic



inference need not offend directly against one of these two rules only. The four rules given in Section 4 (b), one or other of which may be offended against by every invalid syllogistic argument, are in practice the *direct* tests to which we have to appeal in all cases of doubt or difficulty.

(c) *Corollaries from the Syllogistic Rules.*—Three corollaries may be deduced from the four syllogistic rules mentioned in Section 4 (b). Though they are not absolutely necessary for detecting false reasoning, yet they are useful for that purpose. They are:—

1. *From two particular premises nothing can be inferred.*

2. *If one premise is particular, the conclusion must be particular.*

3. *From a particular major and a negative minor, nothing can be inferred.*

*Cor. 1* is deduced thus:—The two particular premises must be either both O, or both I, or one I and the other O. In the first case, no conclusion follows by Rule 5. In the second case, the two particular affirmatives distribute between them no term, so that, the middle term not being distributed even once, no conclusion follows by Rule 3. In the third case, if any valid conclusion is possible, it must be negative (Rule 6). Since negatives distribute their predicates, the major term will be distributed in the conclusion. It must hence be distributed in its premise (Rule 4); so that we must have two terms distributed in the premises, the middle and the major. But I and O distribute between them only one term. Hence, no conclusion can be obtained. The third

case suggests that there ought to be one more distributed term in the premises than in the conclusion; for, if any term is distributed in the conclusion, it must also be distributed in its premise, and along with it the middle term must be distributed also at least once.

*Cor. 2.* As before, the two premises must be both negative, or both affirmative, or one negative and the other affirmative. The first case is impossible by Rule 5. In the second case, the two premises can distribute between them but one term, and this must be the middle term by Rule 3. The minor term not being distributed in the premises, the conclusion must be particular by Rule 4.

In the third case, the two premises distribute between them only two terms. One of these must be the middle term by Rule 3, and the other must be the major term (Rule 4) as the conclusion will be negative (Rule 6) and the major term will be distributed in it. The minor term being thus left undistributed in the premises, the conclusion must be particular by Rule 4.

De Morgan deduces this Corollary from corollary 1 thus:—"If two propositions P and Q together prove a third R, it is plain that P and the denial of R prove the denial of Q. For P and Q cannot be true together without R. Now, if possible, let P (a particular) and Q (a universal) prove R (a universal). Then P (particular) and the denial of R (particular) prove the denial of Q. But two particulars can prove nothing."

In order to have a universal conclusion, we must have *both* the premises universal; for, when the conclusion is affirmative, in order that the minor term may be distributed in the minor premise, this last which must also be affirmative must be universal, and must contain the term



as its subject. The middle term being thus left undistributed in the minor premise, it must be distributed in the major, which must also be affirmative (since the conclusion is affirmative), and which must hence be universal with the middle term as its subject. When the conclusion is negative, three terms will have to be distributed in the premises, and since one of these is affirmative, this is not possible unless both the premises are universal.

The second corollary and the first part of the 6th rule are combined into the following rule, '*conclusio sequitur partem deteriore*;' the conclusion follows the weaker part or premise (the weakness of a premise consisting in its being either negative or particular). Sir W. Hamilton's canon for the figured syllogism runs to the same purpose.

Cor. 3. The minor being negative, the major must be affirmative, by Rule 5. It is also particular, by hypothesis. Therefore, it distributes no term. But the major term is distributed in the conclusion, as this is negative, one of the premises being negative. Thus the syllogism is guilty of illicit major. Hence no valid conclusion can be obtained from two such premises.

(d) *Apparent exceptions to the Syllogistic Rules.*—Jevons remarks that the syllogistic rule, that from two negatives nothing can be inferred, does not hold universally true in its bare and general form without any explanation of the conditions under which it is, or is not, imperative. He gives the following as an example:—

*Whatever is not metallic is not capable of powerful magnetic influence.*

*Carbon is not metallic.*

∴ *Carbon is not capable of powerful magnetic influence.*

This reasoning is valid, but if we regard both the premises as negative, it has four terms, viz., *whatever is not metallic*, *metallic*, *carbon* and *capable of powerful magnetic influence*, and is hence no syllogism. What is intended to be emphasized in the minor premise is, not that carbon is not a metallic substance, but that it is included in the class of non-metallic substances; so that, when reduced to the syllogistic form, the minor becomes *Carbon is not-metallic*, an affirmative proposition. It is true that from two propositions which may both be regarded as negative, a conclusion may sometimes be obtained; e.g., the premises of *Barbara*—*All M is P*, *All S is M*, therefore, *All S is P*—may be obverted and exhibited as negatives, and still the same conclusion follows from them. But then, the resulting argument is not a syllogism. While it is thus untrue to say that from two negatives nothing follows, it remains true that if a syllogism regularly expressed has two negative premises it is invalid.

Dr. Keynes points out that on similar grounds it may be argued, that though the premises *All P is M* and *All S is M* cannot yield a conclusion by Rule 3, yet if we take their obverted contrapositives, viz., *All not-M is not-P* and *All not-M is not-S*, a conclusion is obtainable from them, viz., *Some not-S is not-P*. But this argument, *All P is M*, *All S is M*, therefore, *Some not-S is not-P*, clearly contains more than three terms. Again, *All M is P* and *All not-M is S* yield the conclusion *Some S is not P*, though there is apparently an illicit major; but there are more than three terms in the argument. If we invert

the major premise, we get a valid syllogistic argument in *Bokardo*.

Thus, in all these cases, the exceptions to the syllogistic rules appear only when more than three terms are admitted. The syllogistic rules have been formulated with special reference to reasonings of a particular form, namely, those which contain three and only three terms.

5. The relation of the Syllogistic Rules to the Dictum.—The *Dictum* applies directly to syllogisms in Fig. I, *i.e.*, to syllogisms in which the major term is the predicate of the major premise, and the minor term is the subject of the minor premise. The rules of the syllogism apply independently of the position of the terms in the premises. These rules, however, can all be deduced from the Dictum, thus showing that all the syllogistic arguments can be exhibited in the form to which alone the Dictum directly applies, and that the Dictum is thus the basis of all syllogistic inference. We shall now show how the Dictum contains all the rules. It may be stated as follows :—

*Whatever is distributively predicated, whether affirmatively or negatively, of any class, may be predicated, in like manner, of anything that can be asserted to belong to that class.*

1. This provides for three, and only three terms. There is the term which corresponds to 'whatever,' the term which corresponds to the 'class' of which it is predicated, and the term which corresponds to



'anything that can be asserted to belong to that class.'

2. There is provision in the Dictum for three and only three propositions. There is the proposition in which something is predicated of a class, the proposition in which something is asserted to belong to that class, and the proposition in which the original something which was predicated of a class is predicated of the included something.

3. The Dictum clearly indicates that the term corresponding to 'class' is the middle term; and it prescribes, not merely that this term shall be distributed as seen from the expression, 'whatever is *distributively predicated* of a class,' but also that it shall be distributed as the subject of the major premise, as the proposition corresponding to the same expression is that in which the original predication is made, and is hence the major premise. The ordinary rule about the distribution of the middle term is a generalisation of this provision.

4. The Dictum says that the original predication can be made of 'anything' which can be asserted to belong to the class. This clearly implies that we have no right to make the predication of more than this 'specified anything.' Similarly, we can make the *same* predication about this 'specified anything,' and are not entitled to say anything *more definite*.

5. The Dictum says that the minor premise must be affirmative, as may be seen from the expression, 'that *can be* asserted to belong to that class.'

6. The Dictum prescribes that the original predication which is made of a class shall be made '*in like manner*' of the included something. As it prescribes also that the minor premise shall always be affirmative, this means that if the original predication or major premise is affirmative, the conclusion must be affirmative, and if it is negative, the conclusion must be negative. This gives us the 6th rule.

Thus, the rules of the syllogism are generalised forms of the provisions of the Dictum which are specially applicable to a particular form of reasoning.

#### Exercises.\*

1. Put the following into syllogistic form:—

(a) "We have no right to treat heat as a substance, for it may be transformed into something which is not heat, and is certainly not a substance at all, namely, mechanical work."

(b) How can any one maintain that pain is always an evil, who admits that remorse involves pain, and yet may sometimes be a real good?

In such cases, the procedure is this:—Ascertain the conclusion, and state it distinctly in a proposition so as to distinguish the subject (*minor term*) and the predicate (*major term*). Then, find out the term which does not occur in the conclusion. In a valid syllogism, there must be a middle term and only one. Thirdly, find out the proposition which contains the middle and the major terms (major premise), and the proposition which contains the middle and the minor terms (minor premise). State the major premise first, minor

\* These exercises have been taken from Dr. Keynes' Formal Logic. I have not thought it necessary to give the original authorship in each case.



premise next, and the conclusion last. The validity of this syllogism may be tested, if required, by the syllogistic rules. Adopting this procedure, we have

(a) Whatever may be transformed into something  
.....mechanical work is not a substance.

Heat is what may be transformed, &c.

∴ Heat is not a substance.

(b) Some remorse is (real) good.

All remorse is pain.

∴ Some pain is (real) good.

*i.e.*, some pain is not *not-good*, (or *evil* or *indifferent*).

This is valid on the supposition that *good* is equivalent to *not-evil*.

2. If in a syllogism the middle term is distributed in both premises, what can we infer as to the conclusion?

If the premises are both affirmative, they can between them distribute only two terms; and the middle term is distributed twice in the premises, by hypothesis. Therefore, the minor term is not distributed, and hence the conclusion is particular. If one of the premises is negative, there may be three distributed terms in the premises. But the third distributed term must be the major term, as the conclusion will be negative and the major term will be distributed in it. The minor term not being distributed in the premises, the conclusion is particular. In any case, therefore, the conclusion is particular.

3. If the minor premise be negative, what do you know about the position of the terms in the major?

4. If the major term be the predicate of the major premise, what do we know about the minor?

5. Prove that, when the minor term is predicate in its premise, the conclusion cannot be A.

6. How much can you tell about a valid syllogism if you know (1) that only the middle term is distributed; (2) that

only the middle and minor terms are distributed; (3) that all three terms are distributed?

7. What can be determined respecting a valid syllogism under each of the following conditions :—

- (a) that only one term is distributed, and that only once;
- (b) that only one term is distributed, and that twice;
- (c) that two terms only are distributed, each only once;
- (d) that two terms only are distributed, each twice?

8. Given that the major premise of a valid syllogism is affirmative, and that the major term is distributed both in premises and conclusion, while the minor term is undistributed in both, determine the syllogism.

As the major term is distributed in the conclusion and the minor is not, the conclusion must be *Some S is not P*. Since the major premise is affirmative and the major term is distributed in it, the premise must be *All P is M*. As M is not distributed here, being the predicate of an affirmative premise, it must be distributed in the minor premise. In this premise, then, which must be negative as the conclusion is negative, the middle term must be distributed and the minor undistributed. The premise must, therefore, be *Some S is not M*. The valid syllogism is thus

*All P is M.*

*Some S is not M.*

∴ *Some S is not P.*

9. Given that the major term is distributed in the premises, and undistributed in the conclusion, of a valid syllogism, determine the syllogism.

10. Given that the major premise of a valid syllogism is particular negative, determine the syllogism.

11. Given that the minor premise of a valid syllogism is particular negative, determine the syllogism.

12. Show *directly* in how many ways it is possible to prove the conclusions, *No S is P*, *Some S is P*, and *Some S is not P*.

13. Find, by direct application of the fundamental rules of syllogism, what are the valid forms of syllogism in which neither of the premises is a universal proposition having the same quality as the conclusion.

The conclusion cannot be A, for then, both the premises must be A, which is against the condition; nor can it be E, for then, both the premises must be universal and one of them must be negative, which is also against the condition. If it is I, then both the premises must be affirmative, and one of them at least must be universal, which, again, is against the hypothesis. If it is O, then the negative premise may be particular, and the affirmative premise may be universal. The major premise may be universal affirmative and the minor particular negative, or the major may be particular negative and the minor universal affirmative, the conclusion in each case being O.

14. In what cases will contradictory major premises both yield conclusions when combined with the same minor? How are the conclusions related? Show that in no case will contradictory minor premises both yield conclusions when combined with the same major.

The contradictory major premises may be (a) *All M is P* and *Some M is not P*, (b) *All P is M* and *Some P is not M*, (c) *No M is P* and *Some M is P*, and (d) *No P is M* and *Some P is M*. In each of these cases, it is clear that the minor premise that is to be common to both cannot be negative, since it will not combine with one of the contradictories; nor can it be particular, for the same reason. It must hence be universal affirmative. Again, the term that is distributed in a proposition is undistributed in its contradictory. Hence, the middle term with which the major is compared in the major premise will in each case be found to be undistributed.



in one of the contradictory majors. It must, therefore, be distributed in the minor premise which combines with it, *i.e.*, the premise must be universal affirmative with the middle term as subject. But in the case in which one of the contradictory majors is a particular negative proposition with P as subject, illicit major is involved; so that the possible cases are:—

- |     |                                     |                                      |
|-----|-------------------------------------|--------------------------------------|
| (1) | All M is P                          | Some M is not P                      |
|     | <u>All M is S</u>                   | <u>All M is S</u>                    |
|     | $\therefore$ <u>Some S is P</u>     | $\therefore$ <u>Some S is not P.</u> |
| (2) | No M is P                           | Some M is P                          |
|     | $\therefore$ <u>All M is S</u>      | $\therefore$ <u>All M is S</u>       |
|     | <u>Some S is not P</u>              | $\therefore$ <u>Some S is P.</u>     |
| (3) | No P is M                           | Some P is M                          |
|     | $\therefore$ <u>All M is S</u>      | $\therefore$ <u>All M is S</u>       |
|     | $\therefore$ <u>Some S is not P</u> | $\therefore$ <u>Some S is P.</u>     |

The conclusions in each case are sub-contraries.

The student is recommended to try the latter part of the question himself.

15. If the major premise and the conclusion of a valid syllogism agree in quantity, but differ in quality, find the mood and figure.

16. Given two valid syllogisms in the same figure in which the major, middle, and minor terms are respectively the same, show, without reference to the mnemonic verses, that if the minor premises are contradictories, the conclusions will not be contradictories.

If the minor premises are A and O, the major premise of the syllogism in which the minor premise is O, must be A, and the conclusion must be O. In order that the middle and the

major terms may be distributed in the premises, the syllogism must be

$$\begin{array}{l} \text{All } P \text{ is } M \\ \text{Some } S \text{ is not } M \\ \hline \therefore \text{Some } S \text{ is not } P. \end{array}$$

In the other valid syllogism in which the minor premise is A, since the syllogism is in the same figure, the middle term is not distributed in the minor premise. It must therefore be distributed in the major which must hence be negative. The major must be universal also, since the major term must be distributed in it (the conclusion being negative). Hence the syllogism is :

$$\begin{array}{l} \text{No } P \text{ is } M \\ \text{All } S \text{ is } M \\ \hline \therefore \text{No } S \text{ is } P. \end{array}$$

Thus the conclusions of these two syllogisms are not contradictions.

In the case in which the minor premises are E and I, the major of the syllogism in which the minor is E can only be A and not I, since from a particular major and a negative minor nothing can be inferred. And since the conclusion is negative, in order that the major term may be distributed in it, it must be *All P is M*. Since the minor may be either *No S is M* or *No M is S*, two syllogisms arise :—

$$\begin{array}{ll} (a) \begin{array}{l} \text{All } P \text{ is } M \\ \text{No } M \text{ is } S \\ \hline \therefore \text{No } S \text{ is } P \end{array} & (b) \begin{array}{l} \text{All } P \text{ is } M \\ \text{No } S \text{ is } M \\ \hline \therefore \text{No } S \text{ is } P. \end{array} \end{array}$$

The contradictory of *No M is S* is *Some M is S*, and that of *No S is M* is *Some S is M*, and when either of them is the minor, the major must be negative since the middle term must be distributed in it (the two valid syllogisms must be in the same figure). It must also be universal to provide against illicit major. Hence the syllogisms are,



(a <sup>1</sup> ) No P is M	(b <sup>1</sup> ) No P is M
<u>Some M is S</u>	<u>Some S is M</u>
∴ <u>Some S is not P</u>	∴ <u>Some S is not P.</u>

Thus, the conclusions of (a) and (a<sup>1</sup>) and those of (b) and (b<sup>1</sup>) are not contradictories.

17. Given two valid syllogisms in the same figure in which the major, middle, and minor terms are respectively the same, show, without reference to the mnemonic verses, that if the minor premises are sub-contraries, the conclusions will be identical.

## CHAPTER II.

### MOOD—FIGURE—SPECIAL RULES OF EACH FIGURE.

1. Mood.—A *mood* of the syllogism is its form (L. *modus*, form) as determined by the quantity and quality of the propositions constituting it. A syllogism contains three propositions, and each of these may be either universal or particular, affirmative or negative; combining, then, the symbolic letters A, E, I, and O in all possible ways, we get sixty-four different combinations, each of three letters, which are forms which all syllogistic arguments, valid or invalid, can possibly assume. Some of these forms, however, are not admissible as valid, because they break one or more of the rules already given for valid syllogisms. Thus, the moods EEE and III break the rules 5 and 7 respectively. AEA violates rule 6. We shall give here a list of the possible varieties of constructing a syllogism, and indicate those of them that are excluded by the several rules. The major premise is always stated first.

*Table of selection of valid moods.*

MOODS.			Valid or Invalid.	Rules violated.
1.	A A A	...	Valid.	
2.	A A I	...	"	
	A A E }	...	Invalid.	Converse of Rule 6.
	A A O }	...	"	Rule 6.
	A E A }	...	"	
	A E I }	...	"	
3.	A E E }	...	Valid.	
4.	A E O }	...	Invalid.	Cor. 2 and AIE also the converse of Rule 6.
	A I A }	...	Valid.	
	A I E }	...	Invalid.	Converse of Rule 6.
5.	A I I	...	Valid.	
	A I O	...	Invalid.	Rule 6, and AOA breaks also
	A O A }	...	"	Cor. 2.
	A O I }	...	"	
	A O E	...	"	
6.	A O O	...	Valid.	
	E A A }	...	Invalid.	Rule 6.
	E A I }	...	"	
7.	E A E	...	Valid.	
8.	E A O	...	"	
	I A A }	...	Invalid.	Cor. 2 and IAE also the converse of Rule 6.
	I A E }	...	"	
9.	I A I	...	Valid.	
	I A O	...	Invalid.	Converse of Rule 6.
	O A A }	...	"	Cor. 2 and OAA breaks also
	O A E }	...	"	Rule 6.
	O A I	...	"	
10.	O A O	...	Valid.	
	EEA EOA OEA OOA	...	Invalid.	Rule 5, and the last column also Cor. 1, and EOA, EOE, OEA, OEE also Cor. 2.
	EEE EOE OEE OOE	...		
	E EI EO I OEI OOI	...		
	EEO ECO OEO OOO	...		
	IIA IOA OIA	}	"	Cor. 1. and IOA, IOI, OIA, OII break also Rule 6, IIE and IIO also the converse of Rule 6.
	IIE IOE OIE			
	III IOI OII			
	IIO IOO OIO			
	EIA, EIE	...	"	Cor. 2, and EIA breaks also
	E I I	...	"	Rule 6. [Rule 6.
11.	E I O	...	Valid.	
	I E A }	...	Invalid.	Cor. 2, and IEA also Rule 6.
	I E E }	...	"	
	I E I	...	"	Rule 6.
	I E O	...	"	Cor. 3.

There are thus eleven moods rescued from the scrutiny of the rules. It is a good exercise to the student to invent examples for all the moods, and thus to judge of their validity or invalidity. The following example may be given of IEO.

Some men are wise.

No men are immortal.

∴ Some immortal beings are not wise.

The conclusion distributes its predicate which is not distributed in the premises.

This is a very indirect and unphilosophical procedure in the selection of valid moods. Allied to this is the procedure by which we first ascertain the possible combinations of premises alone and exclude from them those that are impossible by the rules. The valid combinations are AA, AI, AE, AO, IA, EA, EI and OA. We then ascertain what conclusions are possible from each of these combinations. We thus obtain the same eleven moods, AAA, AAI, AII, AEE, AEO, AOO, IAI, EAE, EAO, EIO and OAO.

A more direct and scientific method would be that suggested in exercise 12 of the preceding chapter, by which we ascertain by immediately appealing to the general rules of the syllogism what possible combinations of premises are capable of yielding each of the four possible forms of conclusion, A, E, I and O. Thus, to yield A as conclusion the two premises must be A and A. To yield E, both the premises must be universal and one must be negative, i.e., EA and AE. To yield I, the two premises must be both



affirmative and one of them must be particular, *i.e.*, AI and IA. Or, they may be both universal affirmatives, since those that can yield A can also yield I. To yield O, the premises must be one universal and the other particular, and also one affirmative and the other negative. Thus we get AO, OA, EI and IE. But the last is inadmissible by Cor. 3. O can also be yielded by those premises that can yield E. Thus the valid moods are the same eleven : AAA, EAE, AEE, AII, IAI, AAI, AOO, OAO, EIO, EAO and AEO. It must be noted that in this selection the rules of quality and the corollaries have alone been in requisition, since they can be directly applied without reference to the position of the terms in the premises.

2. *Figure*.—The *figure* of the syllogism is its form as determined by the position of the middle term in the premises. If the middle term be the subject of the major premise and the predicate of the minor, then the syllogism is said to be in the *First Figure*. If it be the predicate of both the premises, then the syllogism is in the *Second Figure*. If it be the subject of both the premises, then it is said to be in the *Third Figure*. If it be the predicate of the major premise and the subject of the minor, then it is in the *Fourth Figure*.

	I.	II.	III.	IV.
Major premise ...	M — P	P — M	M — P	P — M
Minor „ ...	S — M	S — M	M — S	M — S
Conclusion ...	S — P	S — P	S — P	S — P

The first figure was considered by Aristotle as the *Perfect Figure* to which his dictum can be directly applied. He considered the 2nd and the 3rd figures as *imperfect*. The fourth figure, called also the *Galenian Figure* (after Galen, the discoverer) was not recognised by him. The first figure, being taken as the normal or standard figure, the others are so many deviations from it (the 4th being quite the reverse of the 1st), which circumstance sufficiently accounts for the idea implied under the word "figure" borrowed from the language of Rhetoric. But these figures have their own meaning. It is not always that men argue paying particular attention to the position of the middle term and making it the subject of the major premise and predicate of the minor. They argue, and of course the position of the middle term is allotted to it according as they are accustomed to use one form of a proposition or its converse. Taking, for example, a syllogism in the 3rd figure,

No man can claim sympathy from his fellow-creatures,  
Every man is mortal,

∴ Some mortal beings cannot claim sympathy from their fellow-creatures,

we think the natural order of the terms in the minor premise is the one given, and the people are more accustomed to use this form than to use its converse, "Some mortal beings are men," which is necessary to exhibit the argument as a syllogism of the First Figure. This consideration, while it shows the utility of the separate figures, cannot be urged, as some do, to prove that reduction is unnecessary.

We shall have next to see if each of the eleven valid forms of the syllogism which we have ascertained, is valid in each of the figures. There will thus turn up for



examination 44 forms. Of these, however, many will be found to break one or other of the syllogistic rules. Thus AOO in the 1st and the 3rd figures, involves *Illicit major*, as in the following examples:—

1st Figure... { All wise men are happy.  
Some men are not wise men.  
∴ Some men are not happy.

3rd Figure... { All wise men are happy.  
Some wise men are not old.  
∴ Some old men are not happy.

IAI in the 1st and the 2nd figures involves *Undistributed Middle*.

1st Figure... { Some Europeans are Christians.  
All Turks are Europeans.  
∴ Some Turks are Christians.

2nd Figure... { Some Americans are Theosophists.  
All Hindus are Theosophists.  
∴ Some Hindus are Americans.

EAO and EIO are the only two moods which are valid in all the figures, but EAO, as will be seen, will have no place in the first two figures for another reason. The following table will show what rules are violated by (or what fallacies are involved in) the illegitimate moods in the figures. In this selection of the valid moods of each figure, the rules of distribution alone are in requisition, since in the first sifting operation by which the eleven valid moods were ascertained, the rules of quality and the corollaries have been already applied.

*Table of selection of the valid moods in each figure.*

Mood.	1st Figure.	2nd Figure.	3rd Figure.	4th Figure.
AAA	Valid	UM*	IN*	IN
AAI	Valid†	UM	Valid	Valid
AEE	IJ*	Valid	IJ	Valid
AEO	IJ	Valid†	IJ	Valid†
AII	Valid	UM	Valid	UM
AOO	IJ	Valid	IJ	UM
EAE	Valid	Valid	IN	IN
EAO	Valid†	Valid†	Valid	Valid
IAI	UM	UM	Valid	Valid
OAO	UM	IJ	Valid	IJ
EIO	Valid	Valid	Valid	Valid

\* UM = Undistributed Middle; IJ = Illicit Major; IN = Illicit Minor.

† Though valid, yet it is a weakened mood in that figure.

Thus we find that only six moods are valid in each of the figures. Of these, however, AAI and EAO of the 1st Figure, EAO and AEO of the 2nd, and AEO of the 4th, have weak conclusions (*i.e.*, their conclusions are particular while the same premises can yield their corresponding universals) and are, therefore, usually rejected as unnecessary.

Thus EAO, for example,

No diamonds are easily broken,

All glasses are easily broken,

∴ Some glasses are not diamonds,

admits of the universal conclusion, "No glasses are diamonds." Rejecting, then, the five weak moods, we have 19 valid moods. They are distributed as follows:—

1st Figure.	2nd Figure.	3rd Figure.	4th Figure.
A A A	E A E	A A I	A A I
E A E	A E E	I A I	A E E
A I I	E I O	A I I	I A I
E I O	A O O	E A O	E A O
		O A O	E I O
		E I O	

3. The character and the special rules of each figure.—There is another method by which the valid moods of each figure can be ascertained. From the general rules or canons of the syllogism, special rules can be deduced for each figure, and these special rules\* together with the rules of quality and the

\* "Practically, the special rules state the conditions necessary to secure for each position of the middle term that the middle term shall be once distributed, and that no term shall be distributed in the conclusion which was not distributed in the premises."



corollaries will enable us to determine the valid moods. We shall give below the character of each figure, the deduction of its special rules from the general canons, and the determination of its valid moods with the help of these special rules.

The 1st figure is the standard figure. It is "the pure type of a deductive argument." It is the only figure in which the subject of the conclusion is subject in its premise, and the predicate of the conclusion is predicate in its premise. It is the only figure, again, which can prove any of the four forms of conclusion, A, E, I, and O. The special rules are:—  
 (1) *The minor premise must always be affirmative*, and  
 (2) *The major premise must always be universal*.

$$\begin{array}{c} M-P \\ S-M \\ \hline S-P \end{array}$$

If the minor were negative, then the conclusion would also be negative, and P would be distributed in it. Therefore it must be distributed in the major premise in which it is the predicate. Thus, the major premise must also be negative, which is absurd (R. 5). Again, the minor being affirmative, M is not distributed in it. Therefore it must be distributed in the major premise in which it is the subject. Thus the major premise must be universal.

By rule (2) A and E are admitted as major premises, and by rule (1) A and I are admitted as minor premises, in this figure. The possible combinations are AA, AI, EA, EI. From the rules of quality and the corollaries, we know that AA can

yield only A and I, AI can yield only I, EA can yield E and O, and EI can yield only O. Thus the valid moods are AAA, AAI, AII, EAE, EAO, and EIO.

The 2nd figure proves only negative conclusions, and the minor premise may be any of the four A, E, I, and O. The deviation in this figure consists in M being the predicate of the major premise instead of P—M the subject. Since M is a smaller term than S—M P, the premise which contains them cannot  $\overline{S-P}$  be both universal and affirmative; so that, where it is so, i.e., both universal and affirmative, as in AEE, it is not the standard major, but it is the applying minor, and the standard major is the so-called minor premise, a universal negative. If it be universal negative, the very fact that it can be made the standard major by a harmless transposition of the terms, shows that the premise is the major in the same sense as in the 1st figure. EAE and EIO are of this stamp. In AOO, there are distortions which will be noticed under Reduction. The special rules are:—(1) *One premise is negative*, and (2) *the major must be universal*. For, if both the premises were affirmative, then M, the predicate in both the premises, would remain undistributed. Hence the peculiarity of the figure that it proves only negative conclusions. P, being distributed in the conclusion, must be distributed in the major premise in which it is the subject. Therefore the major must be universal.

Rule (2) admits A and E as major premises, and rule (1) requires one of the premises to be E or O.



When A is the major, the minor may be E or O, and when E is the major, since both the premises cannot be negative, the minor may be A or I. Thus we have AE, AO, EA and EI. AE can yield E or O, AO can yield only O, EA can yield E or O, and EI can yield only O. The valid moods are AEE, AEO, AOO, EAE, EAO, and EIO.

The deviation in the 3rd figure consists in M being the subject of the minor premise instead of  $M-P$  the predicate. This premise cannot be *universal* affirmative, since M is a larger term  $\begin{array}{c} M-S \\ S-P \end{array}$  than S. If it be, then there is some distortion. If it be particular affirmative, then, by a simple conversion of the terms, it becomes the standard minor. If it be universal negative, then, also, the terms may be transposed, but then, this cannot be the standard minor; and a change of premises is necessary. The special rules are:—(1) *the minor must be affirmative*, and (2) *the conclusion must be particular*; for, if the minor were negative, then the conclusion would also be negative, in which case, the major term would be distributed in the conclusion. Therefore, it must be distributed in the major premise. But it is not, because it is affirmative. Similarly, if the conclusion were universal, then the minor term must be distributed in the conclusion. But it is not distributed in the minor premise which was just proved to be affirmative. The student is recommended to determine the six valid moods of this figure himself with the help of the rules.

The 4th figure proves all propositions except A. As regards the positions of the terms, it is P—M opposed to the 1st, and thus implies greater  $\frac{M—S}{S—P}$  deviations from it. The special rules are :—

(1) *If the conclusion is negative, the major premise must be universal.*

P, being distributed in the conclusion, it must be distributed in the major premise, in which it is the subject.

(2) *If the minor is negative, both the premises must be universal.*

Since the minor is negative, the conclusion must be negative, and the major premise must, by the previous rule, be universal. M, however, remains undistributed in the major which must be affirmative; and it must consequently be distributed in the minor, in which it is the subject. Thus the minor also is universal. This leads us to the 3rd rule.

(3) *If the major is affirmative, the minor must be universal.*

(4) *If the minor is affirmative, the conclusion must be particular.*

The reader will find that the application of these rules yields six valid moods again.

We have thus got 24 valid moods, six in each figure, though five of these have to be dropped out, as we have seen, since they have weakened conclusions. We can get the moods of the 1st figure directly from the *Dictum*, but we cannot obtain from it the

moods of the other figures which derive their validity from those of the first. The description of the Dictum refers specially to the middle term being the subject of the major and the predicate of the minor.

4. Weakened syllogisms or subaltern moods. —When, from premises that warrant a universal conclusion, its corresponding particular is deduced, the syllogism is said to be *weakened*, or to be in a *Subaltern Mood*. AAI and EAO in Fig. I, EAO and AEO in Fig. II, and AEO in Fig. IV are such weakened syllogisms. Though the particular conclusions are justified by the premises in these cases, yet they are apt to suggest that the corresponding universals cannot be deduced from them. Further, if a particular conclusion is enough for any specific purpose, and you have strong premises to prove it, you may draw the universal conclusion and obtain your required particular by subaltern inference from the universal. In fact, people are never satisfied in argument with merely adducing a particular when it is possible to advance the corresponding universal. Even when the particular is enough to prove their position, they advance the universal by way of adding strength to it. For these reasons, these subaltern moods usually find no place in the enumeration of the valid moods of the various figures (as in the mnemonic verses). The valid moods of the figures, thus reduced in number to nineteen, are usually designated by the names which compose the following mnemonic verse. The three vowels in each name indicate the two premises and the conclusion of the mood designated by the



name. Such a naming is necessary, as the same mood occurring in more than one figure is apt to create confusion unless the figure is also mentioned along with the mood. The student is recommended to commit the mnemonic verse to memory.

Barbārā, Celarent, Dārīi, Fērīoque prioris :  
 Cēsārē, Cāmēstres, Festīnō, Bārōcō, Secundæ :  
 Tertiā, Daraptī, Dīsāmis, Datīsī, Fēlaption, Bōcardō,  
 Fērīsōn, habet : quarta insuper addit,  
 Brāmāntip, Cāmēnes, Dīmāris, Fēsāpō, Fērīsōn.

Each of these names indicates a mood and also its figure. EIO is a valid mood in all the figures, but is indicated by a different name in each. Some of the consonants have meanings which will be explained under Reduction.

5. *Strengthened Syllogisms.*—Of the 19 valid moods thus obtained by dropping out of view the subaltern moods, four may be mentioned in which either the major term is distributed in its premise but not in the conclusion, or the middle term is distributed twice in the premises. These are AAI and EAO of Fig. III, and AAI and EAO of Fig. IV, *i.e.*, *Darapti*, *Felaption*, *Bramantip* and *Fesapo*. In the first two and the last, the middle term is distributed twice in the premises, while in the third the major term is distributed in its premise but not in the conclusion. These are called *Strengthened Syllogisms*, as it is possible in each case to substitute for one of the premises its subaltern, *i.e.*, to take the unnecessarily distributed term in its partial extent, and still obtain the

same conclusion.\* A *strengthened syllogism* is thus a syllogism with an unnecessarily strengthened premise.

It must be noted that the subaltern moods except AEO of Fig. IV are also strengthened moods, as in each case it is possible to substitute for the minor premise its subaltern without affecting the conclusion. The distinction between a strengthened syllogism and a weakened syllogism should be carefully noted. A weakened syllogism is a syllogism with a weakened conclusion, a syllogism in which the *minor* term is distributed in the minor premise but undistributed in the conclusion. A strengthened syllogism is a syllogism with a strengthened premise, a syllogism in which either the major term or the minor is distributed in its premise, but undistributed in the conclusion, or the middle term is distributed twice in the premises. In those strengthened syllogisms which are not also weakened syllogisms, the particular conclusion is all that is inferrible, "their superfluous information referring, not to the minor but, either to the major or to the middle term."

### Exercises.

1. How are the special rules of the figures related to the general rules of the syllogism?
2. Frame rules to provide against (1) Undistributed middle, (2) Illicit major, and (3) Illicit minor, severally in the four figures.
3. Show that O cannot be a premise in the Figures, 1 and 2, that it cannot be major in Fig. 2, and that it cannot be minor in Fig. 3.

---

\* A syllogism in which neither premise is stronger than is necessary to produce the conclusion is called by De Morgan a *Fundamental syllogism*.



4. Can there be a weakened syllogism in the Third Figure?

5. Discuss if *Bramantip* can be regarded as a subaltern mood.

6. Show that *Baroko* bears the same relation to *Camestres* that *Festino* does to *Cesare*, and that *Camenes* is to *Celarent* as *Bramantip* is to *Barbara*.

7. How will you determine the mood AEO when you are told that both the premises are universal and the conclusion is particular, and yet the mood is not a strengthened mood?

---

### CHAPTER III.

#### REDUCTION—MODES OF NOTATION OF SYLLOGISMS.

1. Nature and kinds of Reduction.—The 2nd, the 3rd, and the 4th figures are so many deviations from the 1st, and *Reduction* is the process by which reasonings in the moods of those figures may be expressed in the moods of the first, and thus their validity tested. We are not allowed to introduce any new term in the process; but we can make use of the equivalent propositional forms. Reduction is of two kinds: *Direct* or *Ostensive Reduction*, and *Indirect Reduction* or *Reductio per impossibile*. The former of these is the process by which the conclusion of the given syllogism is shown to follow even when the premises are changed by the legitimate processes of conversion, or transposition, so as to make the middle term the subject of the major and the predicate of the minor, and is the one usually employed to test the truth of our conclusions. The latter consists in supposing the given conclusion to be false and its contradictory true,

and in proving, by constructing a syllogism in the first figure, that by such a supposition we involve ourselves in self-contradiction. This process may be employed to test the validity of all the moods; but it is cumbersome and is used to prove the truth only of *Baroco* and *Bocardo*, for reasons which will be given presently.

## 2. Explanation of the Mnemonic Lines.—

The primary object of the mnemonic verses is to indicate the processes by which the moods of the 2nd, 3rd, and 4th figures can be reduced to those of the 1st. We repeat the verses here for convenience of reference.

Barbăra, Celarent, Dārī, Fērīoque prioris:  
 Cēsārē, Cāmēstres, Festīnō, Bārēcō, secundæ:  
 Tertiā, Dāraptī, Disāmīs, Dātīsī, Fēlaption, Bōcardō,  
 Fērīsōn, habet: Quarta insuper addit  
 Brāmāntip, Cāmēnes, Dīmāris, Fēsāpō, Frēsīson.

Each mnemonic mood shows by its consonants what changes have to be effected in reducing it to a mood of the 1st figure. We shall take *Disamis*. The initial letter shows that it must be reduced to *Dārī* of the 1st figure. The consonant *s* shows that the proposition indicated by the vowel preceding it, i.e., *I*, must be converted *simply*. *M* shows that the premises should change places; and the last *s* shows that the conclusion of the new syllogism should be converted simply in order to get the original conclusion. In *Felaption*, *P* shows that *A* should be converted *per accidens* or by limitation. In *Bocardo*,

again *c* is the symbol of *Reductio ad impossibile*. Thus the symbols of Reduction are :—

B, C, D, F,\* the initial consonants of all the mnemonic moods, showing to what mood of the 1st figure a certain other mood of any of the other figures should be reduced (thus *Felapton* should be reduced to *Ferio*, *Camenes* to *Celarent*, *Disamis* to *Darii*, *Bramantip* to *Barbara*, and so on) ;

*s*, showing *simple conversion* of the proposition preceding it ;

*m*, (*metathesis præmissarum*) indicating change of premises ;

*p*, showing *conversion per accidens* of the proposition preceding it ; and

*c*, being a symbol of *Reductio per impossibile*.

The object of Reduction in the traditional Logic being to prove the legitimacy of a conclusion as drawn from certain premises by showing that the same conclusion follows when the premises are exhibited as premises of the 1st figure, whenever the conclusion of the new syllogism in the first figure is not exactly the same as the original conclusion, it must be transformable into that conclusion by some process of eduction when the mood is really valid. When in the process of reduction to the first figure one of the changes made is the transposition of the premises, it happens that in the new syllogism the original major is the minor term, and the original minor is the major term ; so that, unless the new conclusion is

---

\* Being the first four consonants of the alphabet, they were chosen for the moods of Fig. 1.

converted either *simply* or *by limitation* (as the case may be) the original conclusion is not obtainable. This is indicated by the *final s* or *final p* occurring in all those moods in which *m* occurs. While *s* at the middle of a mnemonic word means that one of the premises of the original syllogism should be converted simply, *s* at the end of a word means that the conclusion of the new syllogism should be converted simply in order to obtain the original conclusion. Similarly with *p* at the middle of a word and *p* at the end of a word. It will be noticed that in no other case does a significant letter end a word. The letter *c*, besides indicating that the mood in which it occurs should be reduced indirectly, also shows by its position that the premise immediately preceding it should be replaced by the contradictory of the conclusion in constructing the new syllogism. Some writers use *k* instead of *c* to denote indirect reduction, and give *Baroko* and *Bokardo* as mnemonic moods. There are certain meaningless letters such as *b*, *d* (both not initial), *l*, *n*, *r*, and *t*; but the last four letters are utilized by some writers who suggest modifications of the traditional verses so as to make each of those letters indicate a figure, abolishing at the same time the other unmeaning letters. Mr. Carveth Read's mnemonic verses may be given as an example:—

*Ballala, Celallel, Dalii, Felioque* prioris.

*Cesane, Camesnes, Fesinon, Banoco* secundæ.

*Tertia Darapri, Drisamis, Darisi, Ferapro, Bocaro, Ferisor*  
habet. *Quarta* insuper addit

*Bamatip, Cametes, Dimatis, Fesapto, Fesistot.*

3. Application of Direct and Indirect Reduction.—The method of indirect proof, otherwise



known as *Reductio per impossibile*, or *Reductio ad impossibile*, or *Deductio ad impossibile*, or *Reductio ad absurdum*, is usually applied to the moods, *Baroco* and *Bocardo*, and this application is the only one contemplated in the mnemonics. This proof consists, as we have said, in supposing the given conclusion to be false and its contradictory true, and in showing that this contradictory, when combined with one of the premises, yields a conclusion in the first figure which contradicts the other premise which we have assumed to be true. An argument in *Baroco* may be stated as follows :—

All Indians are Asiatics (All P is M).

Some Christians are not Asiatics (Some S is not M).

∴ Some Christians are not Indians (Some S is not P).

For, if this conclusion is not true, then its contradictory 'All Christians are Indians (All S is P)' must be true. Taking this, as *c* indicates, as the minor premise of a new syllogism, and the original major as the major, we get

All Indians are Asiatics (All P is M),

All Christians are Indians (All S is P),

∴ All Christians are Asiatics (All S is M)

in *Barbara*. But this conclusion is the contradictory of 'Some Christians are not Asiatics (Some S is not M)' which is one of our original premises which we have accepted as true. Therefore, 'All Christians are Asiatics (All S is M)' must be false. This falsity cannot be due to any flaw in the reasoning, as this is in *Barbara* to which the Dictum is directly applicable.

Nor can it be due to the major premise which is taken from Baroco, and is true by hypothesis. It must therefore be due to the falsity of the minor premise, 'All Christians are Indians (All S is P)'; and if this is false, our original conclusion is true. *Baroco* is hence a valid mood.

Similarly with an argument in *Bocardo*,

Some patriots are not lovers-of-virtue (Some M is not P),

All patriots deserve praise (All M is S),

∴ Some that deserve praise are not lovers-of-virtue (Some S is not P).

For, if this conclusion is not true, then its contradictory must be true. Taking this, as *c* indicates, as the major premise and the original minor as the minor, we get

All that deserve praise are lovers-of-virtue (All S is P),

All patriots deserve praise (All M is S),

∴ All patriots are lovers-of-virtue (All M is P),

in Barbara. But this conclusion contradicts one of our accepted premises, and must hence be false. Arguing as before, we shall find that this falsity must be due to the falsity of 'All that deserve praise are lovers-of-virtue (All S is P).' Hence our original conclusion is true, *i.e.*, *Bocardo* is a valid mood.

We shall now try if in both these cases there is a way of changing the premises so as to obtain a form in the first figure; in other words, if we can reduce them directly. Taking *Baroco*,

All P is M

Some S is not M

∴ Some S is not P

we find that the minor premise or the applying proposition is negative, which is not allowable. We cannot make the major the applying minor, as we cannot by any known logical process make the present minor universal (which it must become if it is to serve as the major). Therefore, the present minor should continue as minor, and should be made affirmative. This can be done by obverting it. But then, in this process, a new term *not-M* is introduced. We should hence seek to change *All P is M* so as to introduce *not-M* in this premise also, and at the same time make it the subject. To this end we should first obvert it and then simply convert it. We thus get

No *not-M* is P

Some S is not-M

∴ Some S is not P.

We have thus reduced *Baroco* directly to *Ferio*. To indicate all these changes, the mnemonic *Faksoko* has been suggested,\* *k* being the symbol of obversion, *† s* of simple conversion, and hence *ks* of obversion followed by conversion, or contraposition. Mr. Carveth Read's mnemonic is *Faksnoko*.

Next, taking *Bocardo*,

Some M is not P,

All M is S,

∴ Some S is not P,

---

\* By the late Professor Croom Robertson.

† This is why we preferred to symbolize *Reduction per impossibile* by *c*, since if *k* should indicate both, it would cause confusion.



we find the major a particular proposition which is not allowable in the first figure. We can secure a universal major, however, by making the present minor, the major. The applying proposition must be affirmative; and the present major which must become the minor and which is negative in form, may, by obversion, be rendered affirmative. Besides, it should also be converted simply in order that M may become the predicate. Effecting these changes, we get

All M is S

Some not-P is M

∴ Some not-P is S

or Some S is not-P (by simple conversion)

or Some S is not P (by obversion).

We have thus reduced *Bocardo* to *Darii*. *Doksamosk* is the mnemonic suggested\* to indicate these changes. *sk* shows that the conclusion of *Darii* should be first simply converted, and this converse next obverted, in order to get the original conclusion. Mr. Carveth Read's mnemonic is *Doksamosk*.

When it is thus possible to reduce *Baroco* and *Bocardo* directly to the first figure, why did the scholastic logicians adopt the Indirect method as the only method available for reducing those moods to Fig. I†? Because they objected to the use of negative terms (as in obversion and contraposition). Owing to the possibility of reducing

---

\* By the late Professor Croom Robertson.

† Indirect reduction to Fig. I is not the same thing as direct reduction to Fig. I. In the former, an argument in Fig. I entirely different from the given argument is employed to prove the validity of this last, while, in the latter, the given argument itself is transmuted into a form to which the Dictum is directly applicable.



them easily by the direct method, some modern logicians are inclined to banish the indirect method, which is complex, altogether from their treatment of the syllogism. But Dr. Keynes thinks that the direct method is as complex as the indirect as applied to these moods, and that, therefore, the latter is as natural as the former.

To all the other moods, direct or ostensive reduction is primarily to be applied; and this is contemplated in the mnemonic verses. It is, however, possible to reduce them all indirectly also.

*Cesare*                      No minerals have life.  
                                  All plants have life.  
                                   $\therefore$  No plants are minerals.

When ostensively reduced, the mood becomes

E. No beings that possess life are minerals.

A. All plants possess life.

E.  $\therefore$  No plants are minerals.

In reducing it indirectly, we combine the contradictory of the conclusion, *viz.*, 'Some plants are minerals' with 'No minerals have life,' and obtain a syllogism in *Ferio* which shows a conclusion contradictory to what we have accepted as true. We may accordingly infer that our original conclusion is true.

<i>Camestres</i>	reduced to	<i>Celarent.</i>
All men are discontented,	No discontented beings are	
No angels are discontented,	angels,	
$\therefore$ No angels are men.	All men are discontented,	
	$\therefore$ No men are angels.	

We must convert simply the new conclusion in order to obtain the old. *Indirectly*, we suppose the contradictory of the conclusion, namely, 'Some angels are men' to be true, and combining this with 'All men are discontented' as the major, we get a syllogism in *Darii*, the conclusion of which

contradicts one of our original premises. Hence our original conclusion is true.

<i>Festino</i>	reduced to	<i>Ferio.</i>
No politicians are shortsighted.		No shortsighted men are politicians.
Some men are shortsighted.		Some men are shortsighted.
∴ Some men are not politicians.		∴ Some men are not politicians.

*Indirectly*, denying the truth of the conclusion, we accept the truth of its contradictory, *viz.*, 'All men are politicians' and combining this with the given major, we obtain the premises of Celarent, which yield a conclusion which contradicts one of our own premises. Thus, the consequence of the denial of the truth of the given conclusion as inferred from the given premises, is a self-contradiction.

<i>Darapti</i>	reduced to	<i>Darii.</i>
All Brahmins are vegetarians.		All Brahmins are vegetarians.
All Brahmins are pious.		Some pious men are Brahmins.
∴ Some pious men are vegetarians.		∴ Some pious men are vegetarians.

*Syllogism in Celarent obtained by the indirect process.*

No pious men are vegetarians—Contradictory of the original conclusion.

All Brahmins are pious—Original minor.

∴ No Brahmins are vegetarians—Contrary of the original major.

(The student, if required to prove indirectly, must formally go through all the steps as given under the indirect reduction of *Baroco*. We only give hints.)

<i>Disamis</i>	reduced to	<i>Darii.</i>
Some Indians are Christians.		All Indians are Asiatics.
All Indians are Asiatics.		Some Christians are Indians.
∴ Some Asiatics are Christians.		∴ Some Christians are Asiatics.

We can get our original conclusion by simply converting the new.

*Syllogism resulting in Celarent by Indirect reduction.*

No Asiatics are Christians—Contradictory of the conclusion.

All Indians are Asiatics—Original minor.

∴ No Indians are Christians—Contradictory of the original major.

<i>Datisi</i>	reduced ostensively to	<i>Darii.</i>
All Englishmen are patriotic.		All Englishmen are patriotic.
Some Englishmen are brave.		Some brave men are Englishmen.
∴ Some brave men are patriotic.		∴ Some brave men are patriotic.

*Syllogism in Ferio by Reductio ad impossibile.*

No brave men are patriotic—Contradictory of the conclusion.

Some Englishmen are brave—Original minor.

∴ Some Englishmen are not patriotic—Contradictory of our major.

<i>Felapton</i>	reduced ostensively to	<i>Ferio.</i>
No Hindus are patriots.		No Hindus are patriots.
All Hindus are intelligent.		Some intelligent men are Hindus.
∴ Some intelligent men are not patriots.		∴ Some intelligent men are not patriots.

*Syllogism resulting in Barbara by Indirect reduction.*

All intelligent men are patriots—Contradictory of the conclusion.

All Hindus are intelligent—Original minor.

∴ All Hindus are patriots—Contrary of the original major.

<i>Ferison</i>	reduced to	<i>Ferio.</i>
No men are perfect.		No men are perfect.
Some men are wise.		Some wise beings are men.
∴ Some wise beings are not perfect.		∴ Some wise beings are not perfect.



*Syllogism in Darii by Reductio ad impossibile.*

All wise beings are perfect—Contradictory of the conclusion.

Some men are wise—Original minor.

∴ Some men are perfect—Contradictory of the major (absurd.)

*Bramantip* reduced ostensively to *Barbara.*

All Brahmins are Hindus.

All Hindus are Asiatics.

All Hindus are Asiatics.

All Brahmins are Hindus.

∴ Some Asiatics are Brahmins. ∴ All Brahmins are Asiatics.

P indicates that the given conclusion is obtained by converting the new universal conclusion *per accidens*.

*Indirect reduction to Celarent.*

No Asiatics are Brahmins—Contradictory of the conclusion.

All Hindus are Asiatics—Original minor.

∴ No Hindus are Brahmins } Contrary of the major.  
or No Brahmins are Hindus }

The major being true, this conclusion must be false.

*Camenes* reduced to *Celarent.*

All moralists are prejudiced.

No prejudiced men are perfect.

No prejudiced men are perfect.

All moralists are prejudiced.

∴ No perfect beings are moralists.

∴ No moralists are perfect.  
or, No perfect beings are moralists.

*Indirect reduction to Darii.*

All moralists are prejudiced—Original major.

Some perfect beings are moralists—Contradictory of the conclusion.

∴ Some perfect beings are prejudiced.

∴ Some prejudiced men are perfect—Contradictory of the original minor (absurd).



*Dimaris*

reduced to

*Darii.*

Some merchants are honest.	All honest men deserve encouragement.
All honest men deserve encouragement.	Some merchants are honest.
∴ Some that deserve encouragement are merchants.	∴ Some merchants deserve encouragement.
	or, Some that deserve encouragement are merchants.

*I. Reduction to Celarent.*

None that deserve encouragement are merchants.

All honest men deserve encouragement.

∴ No honest men are merchants,

or, No merchants are honest.—Contradictory of our major.

*Fesapo*

reduced to

*Ferio.*

No gods are men.	No men are gods.
All men are fallible.	Some fallible beings are men.
∴ Some fallible beings are not gods.	∴ Some fallible beings are not gods.

*I. Reduction to Barbara.*

All fallible beings are gods—Contradictory of the conclusion.

All men are fallible—Original minor.

∴ All men are gods—Contrary of the converted major (absurd).

*Fresison*

reduced to

*Ferio.*

No Frenchmen are Asiatics.	No Asiatics are Frenchmen.
Some Asiatics are Christians.	Some Christians are Asiatics.
∴ Some Christians are not Frenchmen.	∴ Some Christians are not Frenchmen.

*I. Reduction to Darii.*

All Christians are Frenchmen—Contradictory of the conclusion.

Some Asiatics are Christians—Original minor.  
 $\therefore$  Some Asiatics are Frenchmen,  
 or, Some Frenchmen are Asiatics.—Contradictory of the  
 major (absurd).

Further, one mood of one figure can be transmuted  
 into another of the same figure, unless this mood is a  
 subaltern mood. For instance, *Barbara* can be reduced  
 to *Celarent* by obversion of the major premise and the  
 conclusion, *Celarent* to *Barbara*, *Darii* to *Ferio* and  
*Ferio* to *Darii*, *Cesare* to *Camestres* and *Camestres* to  
*Cesare*, and so on.

*Cesare.*                      *Camestres.*

No P is M = All P is not-M,

All S is M = No S is not-M,

$\therefore$  No S is P = No S is P.

*Darapti.*                      *Felapton.*

All M is P = No M is not-P,

All M is S = All M is S,

$\therefore$  Some S is P = Some S is not not-P,  
 or Some S is P.

The student is recommended similarly to transmute  
 the other moods into one another. The possibility of  
 reducing the 15 moods of the other figures to the  
 four moods of the first implies the possibility of  
 obtaining the 15 moods from the four standard forms.  
 Even of these four standard forms, it may be pointed  
 out that *Darii* and *Ferio* are, to all intents and  
 purposes, *Barbara* and *Celarent* respectively, since  
 the "some S" in the minor is, and is known to be,  
 the same some as in the conclusion. The unity of the  
 syllogistic reasoning thus becomes apparent.

4. The special dicta and the uses of the figures.—We have already alluded to the special advantages which the First Figure claims over the other figures. It is the application of a general principle to a special case in pure form. It is the only figure in which A can be proved, and is thus best fitted for establishing scientific truths of a deductive character. It also proves conclusions of the other propositional forms, being thus adapted for proving complete denial, or for establishing the contradictories of universal statements. It is the only figure in which the positions of the terms (as subject or predicate) are the same both in conclusion and in premises, "so that the course of argument has in its mere expression an easy and natural flow." For these reasons, and for the fact that the *Dictum de omni et nullo* is directly applicable to it, Aristotle and other eminent logicians regarded it as the only perfect form of syllogistic inference. Some logicians, however, who do not hold that the first figure is the only cogent form of syllogistic inference, and that the validity of syllogisms in the other figures can only be made evident when exhibited in that form, give a separate axiom for each of the other figures, as applicable directly to the moods of that figure, as exhibiting the naturalness of that figure for establishing a special class of conclusions, and as adequately showing the conclusiveness of its reasonings. Their axiom for Fig. 2 is called the *Dictum de diverso*, and may be enunciated thus:—  
"If a certain attribute can be predicated, affirmatively



or negatively, of every member of a class, any subject of which it cannot be so predicated, does not belong to the class." The special rules of this figure are obtained directly from this axiom. Negative conclusions alone can be proved in this figure, and hence arguments intended to disprove assertions naturally assume this form. The process of eliminating alternatives so as to restrict a predication to one, is done in this figure by a succession of syllogisms: *e.g.*, S is either P, Q, or R; it is not P, and therefore, it must be Q or R; it is not Q, and therefore, it must be R. It has for this reason been called the *Exclusive Figure*.

Mansel gives two axioms for Fig. 3 called the *Dictum de exemplo*, and the *Dictum de excepto* (instead of the one, the *Dictum de exemplo*, given by Lambert) which may be compounded into one thus:—"If a certain attribute can be affirmed or denied of any portion of the members of a class, it is not incompatible with, or not inseparable from, the distinctive attributes of that class." Or, more clearly, it may be stated thus:—"If two attributes can be predicated of a class, either both affirmatively, or one affirmatively and the other negatively, the reference in either case being to the whole class once at least, then these two attributes either sometimes accompany each other, or the attribute that is affirmed is not always accompanied by the other." Particular conclusions alone can be proved in this figure, and it is hence specially adapted to establish exceptions to general principles. This is the most natural figure for stating arguments in which the middle term is singular:—



Socrates was wise,  
Socrates was poor,  
∴ Some poor man was wise.

The axiom for the 4th figure is called the *Dictum de reciproco*, and may be enunciated thus:—"Three classes cannot be so related, that the first is wholly included in the second, the second wholly excluded from the third, and the third partly or wholly included in the first."\* No particular use is claimed for this figure.

5. The place of Reduction in Syllogistic theory.—Those that hold that the *Dictum de omni et nullo* which applies directly to the first figure, is the basis of all syllogistic inference, hold that reduction to the first figure is absolutely necessary for proving the validity of all other forms of reasoning. Others, following Lambert, hold that Reduction is both *unnecessary* and *unnatural*. It is *unnecessary* because each figure has its own dictum, and has hence independent validity. It is even said that the validity of any particular syllogism is as self-evident as that of any mood of the first figure, or as that of the *Dictum de omni et nullo*; so that, though the dicta are useful as generalisations of the syllogistic process, they are needless to prove the validity of any particular syllogism. Reduction is also said to be *unnatural*, because we have to make changes which

---

\* This is Mr. Johnson's enunciation. The special dicta have been usually attributed to Lambert, but different logicians have different enunciations of them.

yield *unnatural* and inelegant predications, as in the following:—

Socrates was wise,

*Some poor man was Socrates,*

∴ Some poor man was wise.

Certain arguments fall naturally into figures other than the first. Now, it may be true that the validity of the abstract moods, nay, even of particular concrete syllogisms, is obvious to those that are capable of abstract thinking. But the aim of science is to unify knowledge, and, as Dr. Read points out, after generalising the nineteen moods, it is but another step in the same direction to reduce these moods to one form. If so, what can the recognition of separate dicta mean for the several figures? Unless these dicta, again, are reduced to one dictum, the science of Logic is not complete. Moreover, as Dr. Read asks, what is gained by reducing the principles of the other figures to the *Dictum*, instead of the moods of the other figures to those of the first figure? Perhaps, the best justification for this is regularity of procedure. As for the second argument, the fact that certain arguments fall naturally in the other figures than the first cannot be urged as a reason for dispensing with reduction. As Dr. Read says, in the science of proof, elegance of assertion is an altogether extraneous consideration. Both for the reason that Reduction makes apparent the essential unity of all syllogistic inference, rendering the syllogistic theory *scientifically* complete, and for the reason that it affords a good

exercise to the student of Logic, it fills a very important place in the theory of the syllogism.

6. **The Fourth Figure.**—This figure was not recognised by Aristotle. Its moods were worked out by the earlier Peripatetics, but the figure itself was explicitly constituted, it is believed, by Galen. It is hence called the Galenian Figure. Some modern logicians reject it on the ground that it is only the First Figure with a converted conclusion; that is to say, "we do not actually reason in the Fourth, but only in the First, and then if occasion requires, convert the conclusion of the First." Dr. Keynes points out that this is not a correct account of Figure 4, as it will not apply to *Fesapo*, or *Ferison*. From *No P is M* and *All M is S* we cannot get any conclusion in Fig. 1. Again, it is said that the order of thought is wholly inverted in this figure, the subject of the conclusion having been predicate in its premise, and the predicate of the conclusion having been subject in its premise. But is it not true that in Figs. 2 and 3 also there is an inversion, though partial, of the natural order of thought? It may be a reason why arguments in common usage do not naturally fall into that figure, but it is not an adequate reason for rejecting the figure altogether. The truth is, that, if distinction of figure be recognised at all, the Fourth Figure must also be recognised, as it is also a possible arrangement of terms, and, as such, necessary to give scientific completion to the doctrine of Figure.

7. **Syllogisms with singular premises.**—*Darapti* and *Felapton* are the moods into which syl-



logisms with singular premises most naturally fall. Dr. Bain says that in the case of such syllogisms we can hardly be said to have a real deductive or syllogistic inference which consists in the application of a general principle to a special case. He takes the following syllogism, and says it is merely a case of immediate inference.

Socrates was the master of Plato,

Socrates fought at Delium,

Therefore the master of Plato fought at Delium. The two premises may be compounded into "Socrates was the master of Plato and fought at Delium," and then, the conclusion is seen to be only a part of this statement. He says that such a mere reproduction of only a part of the original statement cannot be said to be real inference. "Such an operation keeps strictly within the domain of Equivalence or Immediate Inference. In no way, therefore, can a syllogism with two singular premises be viewed as a genuine syllogistic or deductive inference."

But is it not true that in every syllogism, and more particularly in the syllogisms of the third figure, the conclusion says "less than had been previously said"?

All poets are esteemed,	} All poets are esteemed
All poets are poor,	

∴ Some poor men are esteemed.

All men are mortal,	} All men including kings
All kings are men,	

∴ All kings are mortal.

The truth is, that this is not the proper mode of treating syllogisms with singular premises. The middle



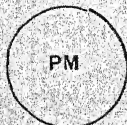
term (whether singular or general) with the part it plays in the premises cannot appear in the conclusion, so that, the conclusion will in every syllogism be less than what is contained in the premises. The object of such syllogisms is mostly to contradict universal statements by proving exceptional cases; and, in doing so, we transfer *what is universally known to co-exist in a singular subject to another with which also it is now ascertained by material examination that the same subject co-exists: e.g.,*

Descartes was a philosopher,  
 Descartes was a mathematician,  
 $\therefore$  Some one mathematician was a philosopher.

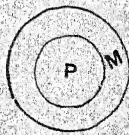
### 8. Modes of notation of Syllogisms:—

(1) We shall take *Baroco* to illustrate the application of Euler's circles to syllogistic reasonings. The premises of *Baroco* are represented thus:—

*All P is M.*

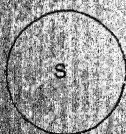


(i)

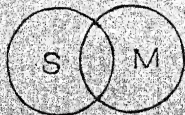


(ii)

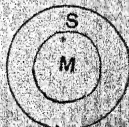
*Some S is not M.*



(a)

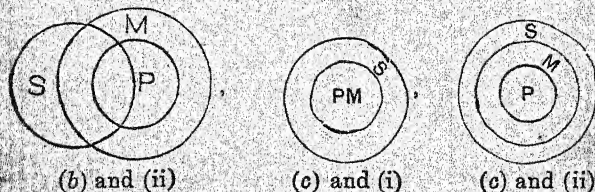
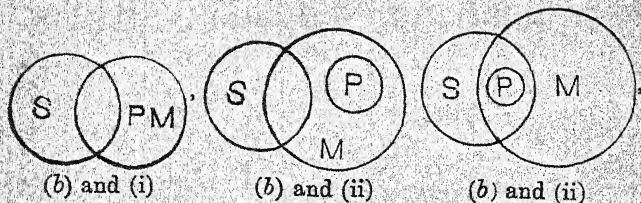
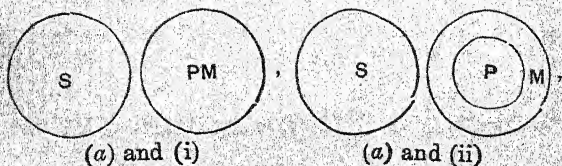


(b)



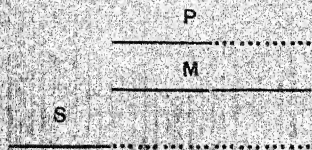
(c)

We shall now see if by combining each of the figures for the minor with each of the figures for the major, we get some one of the figures representing the conclusion, *Some S is not P*.

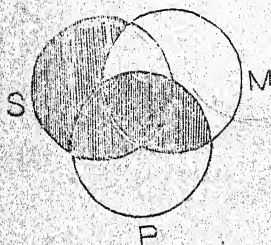
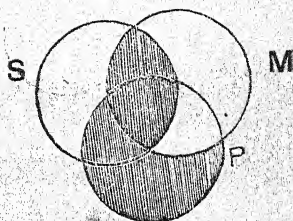


If we omit the figure for *M* from all these cases, we find that only three figures are yielded which all represent *Some S is not P*.

(2) *Baroco* is represented in Lambert's scheme thus:—



(3) In Venn's scheme only universal syllogisms can be represented. *Celarent* and *Camenes* may be taken as examples,

*Celarent.**Camenes.*

The student is recommended to represent the other moods also by these diagrams.

## CHAPTER IV.

### *HYPOTHETICAL AND DISJUNCTIVE SYLLOGISMS— HYPOTHETICAL INFERENCE AS MEDIATE OR IMMEDIATE—DILEMMA.*

#### 1. Hypothetical Syllogisms:—

(a) *Pure Hypothetical Syllogisms.*—We have seen that distinctions of quality and quantity can be applied to hypothetical propositions, and hence we can have syllogisms with hypothetical premises and a hypothetical conclusion. The antecedent of the conclusion corresponds to the minor term of the categorical syllogism, the consequent of the conclusion, to the major term, and the term which appears only in the premises, to the middle term. The rules regulating



categorical reasonings also regulate hypothetical reasonings. We have distinctions of mood and figure in the same way as in the case of the categorical syllogism. The following are examples :—

The form which corresponds to *Celarent*.

If any S is M, then never is it P,

If any S is Q, then always it is M,

∴ If any S is Q, then never is it P.

If any government is tyrannical, then never is it popular; if any government is selfish, then always it is tyrannical; therefore, if any government is selfish, never is it popular.

The form corresponding to *Baroco*.

If any S is P, then always it is M,

If any S is Q, sometimes it is not M,

∴ If any S is Q, sometimes it is not P.

If any people are contented, then always they are well governed; if any people are politically educated, then sometimes they are not well governed; therefore, if any people are politically educated, then sometimes they are not contented.

The form corresponding to *Bocardo*.

If any S is M, sometimes it is not P,

If any S is M, always it is Q,

∴ If any S is Q, then sometimes it is not P.

If mistakes are committed, sometimes they are not corrected; if mistakes are committed, always they are noticed; therefore, sometimes if mistakes are noticed, they are not corrected.



The form corresponding to *Fresison*.

If any S is P, then is it never M,

If any S is M, sometimes it is Q,

∴ If any S is Q, sometimes it is not P.

If a person is contented, then is he never unhappy; if a person is unhappy, sometimes he is selfish; therefore, if a person is selfish, sometimes he is not contented.

The doctrine of Reduction is applicable to these hypothetical syllogisms in the same way as it is to pure categoricalals.

(b) *Hypothetico-Categorical Syllogisms*.—These are syllogisms with a hypothetical major premise, a categorical minor, and a categorical conclusion, e.g.,

If S is M, it is P.

S is M.

∴ S is P.

Some logicians designate this form of reasoning by the name 'hypothetical,' and do not recognise as of any importance the other form in which all the propositions are hypothetical, probably from its close resemblance to categorical reasoning. For the same reason, they do not recognise also the form mentioned by Dr. Keynes, in which each of the three hypotheticals composing the reasoning unite propositions of independent import. The major premise of the hypothetico-categorical reasoning may be stated either in the connotative form as in the above example, or in the denotative form as follows:—

If any S is M, that S is P, If or whenever A is B, C is D.

*This* S is M,

Now A is B.

∴ *This* S is P

∴ C is D.

In the latter case, the essential nature of syllogistic reasoning—the application of a general principle to a special case—becomes more prominent. It is the discovery of a special case of the concrete embodiment of the general relation. Accepting the necessity of predicating a certain attribute of any subject when this is found to possess certain marks, we *do* predicate that attribute of a subject when on material examination we find it possessing those marks. Again, after accepting the truth of the same hypothetical major, if we find on material examination that the attribute in question is not predicable of a given subject, then it means that the subject does not possess the requisite marks. These are the only two valid forms of the hypothetico-categorical syllogism. *By affirming the antecedent we can affirm the consequent, and by denying the consequent we can deny the antecedent.* It is immaterial which form we use for the purposes of illustration, whether the form in which the major premise contains three terms, or the form in which it contains four terms, so long as we remember that the four terms of a true hypothetical can always be reduced to three. We shall however adopt the most general expression of the hypothetical relation, viz., If P, then Q. The two valid moods are :—

- (1) If P, then Q; but P; therefore, Q.

If any people are well-governed, they are happy;  
Englishmen are well-governed; therefore, they are happy.

- (2) If P, then Q; but not Q; therefore not P.

If any student is mischievous, he is liable to be punished ; Sankar is not liable to be punished ; therefore, Sankar is not mischievous.

The first form is called the *modus ponens*\* (the mood which posits or affirms, called also the *constructive* hypothetical syllogism), and the second is called the *modus tollens*\* (the mood which denies or sublates, called also the *destructive* hypothetical syllogism). Expressing the *modus ponens* and the *modus tollens* in pure categorical form, we shall find that they correspond to *Barbara* and *Camestres* respectively.

- (1) *All cases of P being true are cases of Q being true.*

The present case is *a case of P being true.*

∴ The present case is a case of Q being true.

- (2) *All cases of P being true are cases of Q being true.*

The present case is *not a case of Q being true.*

∴ The present case is not a case of P being true.

It is necessary to warn the reader against the error of supposing that by denying the antecedent we can also deny the consequent, and by affirming the consequent we can also affirm the antecedent. 'If dishonesty be encouraged, the union will collapse.' The fact that dishonesty is not encouraged does not involve the other fact that the union will not collapse. There may be other causes working towards that end, for instance, want of funds, bad management, &c. The fallacy in

---

\* Some prefer to call the *modus ponens* the *modus ponendo ponens*, and the *modus tollens*, the *modus tollendo tollens*.



this case may be called the fallacy of *denying the antecedent*. This may be seen to correspond to the fallacy of *illicit major* in the categorical syllogism.

All cases of dishonesty being *encouraged* are cases of *the union collapsing*.

The present case is not a case of dishonesty being *encouraged*.

∴ The present case is not a case of *the union collapsing*.

Again, affirmation of the consequent does not justify affirmation of the antecedent for the same reason. 'If the spleen is injured, death follows.' We cannot say that, because death has occurred in this instance, the spleen must have been injured. Death might have occurred from some other cause. The fallacy in this case is the fallacy of *affirming the consequent*. It corresponds to the fallacy of *undistributed middle* of the categorical syllogism.

All cases of the injury of the spleen are cases of death occurring.

The present case is a case of death occurring.

∴ The present case is a case of the injury of the spleen.

It should be borne in mind, however, that in both these cases of erroneous reasoning from a hypothetical premise, if the antecedent be the sole condition of the consequent, there will be no fallacy.

The hypothetical major premise of the hypothetico-categorical syllogism may assume four forms, according as the antecedent, or the consequent, is either affirmative or negative.

- (1) If P, then Q.
- (2) If not P, then Q.
- (3) If P, then not Q.
- (4) If not P, then not Q.



With each of these as the major, we can have two valid moods, the *modus ponens* and the *modus tollens*. The student is recommended to write down all these eight moods, and see to what mood of the categorical reasoning each of them corresponds. It will then be noted that the distinction between *modus ponens* and *modus tollens* turns, not upon the absolute quality of the conclusion, but upon whether it affirms the consequent because the antecedent is affirmed, or denies the antecedent because the consequent is denied. The affirmation of the consequent may be *absolutely* a denial, and a denial of the antecedent may be *absolutely* an affirmation. The *modus ponens* can be reduced to the *modus tollens* and *vice versa*. The student is recommended to try the reduction.

2. Is the Hypothetico-categorical inference mediate or immediate?—Dr. Bain, agreeing with Boole and De Morgan, holds that the hypothetico-categorical inference is immediate in character. Taking the example,

If A is B, C is D

A is B

∴ C is D,

he says that "there is no inference in this case. Accepting *A is B*, we accept *C is D*; this is another expression for the same fact. 'If the weather continues fine, we shall go to the country' is transformable into the equivalent form 'The weather continues fine, and so we shall go into the country.' Any person affirming the one, does not, in affirming the other, declare a new fact, but the same fact. No new matter

is introduced into the assertion ; it is a pure instance of the Law of Consistency."

Now, if it is true that the antecedent of the hypothetical major is an actual occurrence ascertained on material examination to be true, then the hypothetical major contains the conclusion also as a matter of fact, and the assertion of it is a case of immediate inference. Then, and then alone, is the proposition 'If the weather continues fine, we go to the country' is transformable into 'The weather continues fine and we go to the country.' But our going to the country is stated to be dependent on the contingency of the weather continuing to be fine. We have as yet no knowledge as to the actual occurrence of this latter fact, and, when this knowledge is gained, it no doubt immediately follows that the former will take place. But the gaining of this knowledge is a distinct fact, possible only on material examination. Nor can this piece of knowledge yield by itself the conclusion immediately as a fact, without the aid of the hypothetical statement constituting the major premise. In the absence of this premise, the conclusion 'We go to the country' can never follow from 'The weather is fine.' Thus, both the hypothetical major and the categorical minor are necessary for the conclusion 'We go to the country.' The hypothetical major is the result of one inquiry, and the categorical minor, which is the antecedent of the major, is the result of another inquiry ; and until these two results are obtained, the categorical assertion of the consequent *which is a distinct fact from the antecedent*

is not possible. Referring to Dr. Bain's statement that the hypothetical major, 'If the weather continues fine, we go to the country' is equivalent to 'The weather continues fine, and we go to the country,' Dr. Keynes asks if the propositions, 'If war is declared, I must return home,' and 'If the sun moves round the earth, modern astronomy is a delusion,' can be regarded as respectively equivalent to 'War has been declared, and so I must return home,' and 'The sun moves round the earth, and so modern astronomy is a delusion.' "Besides, if the proposition, *If P is true then Q is true*, implies the truth of P, what becomes of the possible reasoning. 'But Q is not true, therefore, P is not true'?"

Other arguments brought forward in support of the view that the hypothetico-categorical inference is immediate are given by Dr. Bain (*Logic Deduction*, p. 117). "The obvious differences between the syllogism and the hypothetical reasoning are (1) the absence of a middle term; in the hypothetical syllogism all the terms are introduced in the so-called major; (2) the minor and the conclusion indifferently change places, and each of them is merely one of the two members constituting the major; (3) the major (so-called) consists of two propositions, the categorical major, of two terms."

Regarding the first, we may say that the middle term being that which appears in the premises but not in the conclusion, there is such a term in the hypothetical syllogism. It is perhaps more correct to say that there is no minor term. But this term is



implicitly contained in the categorical minor, and becomes explicit when the syllogism is reduced to the pure categorical form.

The second argument is erroneous. In the syllogism,—If *A* is *B*, *C* is *D*; *A* is *B*; therefore, *C* is *D*—*C* is *D* and *A* is *B* cannot change places; for, if they do, there will arise the fallacy of *affirming the consequent*.

The third argument does not affect the question at issue, but merely describes the form of the hypothetical syllogism, as distinguished from that of the categorical.

In answering Dr. Bain's objection, we have pointed out that the two premises of a hypothetico-categorical syllogism are distinct from each other, and are equally necessary for drawing the conclusion. That its moods and fallacies correspond to certain moods and fallacies of the categorical syllogism may also be adduced in proof of the fact that it is mediate.

Let *X*, *Y*, *Z*, *P*, *Q*, *R* be six propositions.

- Given (1) If *X* is true, *P* is true;  
 (2) If *Y* is true, *Q* is true;  
 (3) If *Z* is true, *R* is true;  
 (4) Of *X*, *Y*, *Z*, one at least is true;  
 (5) Of *P*, *Q*, *R*, not more than one is true;

prove syllogistically

- (i) If *P* is true, *X* is true;  
 (ii) If *Q* is true, *Y* is true;  
 (iii) If *R* is true, *Z* is true;  
 (iv) Of *P*, *Q*, *R*, one at least is true;  
 (v) Of *X*, *Y*, *Z*, not more than one is true.

Now, according to (5), if *P* is true, *Q* is *not true* and *R* is *not true*.



If Q is not true, Y is not true, (2)

If P is true, Q is not true, (5)

∴ If P is true, Y is not true.

Also, If R is not true, Z is not true, (3)

If P is true, R is not true, (5)

∴ If P is true, Z is not true.

Thus, If P is true, Y is not true and Z is not true,

But Of X, Y and Z, one at least is true, (4)

∴ If P is true, X is true. (i)

Similarly, we can prove (ii) and (iii) by supposing Q and R to be severally true and the two others false.

Again, If P is not true, X is not true. (1)

If Q is not true, Y is not true. (2)

If R is not true, Z is not true. (3)

But Of X, Y and Z, one at least is true. (4)

∴ Of P, Q and R also, one at least must be true. (iv)

The student is advised to expand the above reasoning syllogistically.

Again, Of X, Y and Z, if more than one were true, more than one of P, Q and R would be true also;

But Of P, Q and R, not more than one is true.

Therefore, Of X, Y and Z also, not more than one is true. (v)

### 3. Disjunctive Syllogisms :—

(a) *Pure Disjunctive Syllogisms.*—A pure disjunctive syllogism is a form of reasoning in which a disjunctive conclusion is drawn from two disjunctive premises. This type of reasoning is not usually recognised by logicians, as it is not of much importance. But the possibility of it cannot be denied, as disjunctive propositions can be expressed as hypotheticals, and as pure hypothetical syllogisms are considered possible. One point, however, must be noted, viz., the middle term must in one premise be negative, and in

the other positive ; for, from two propositions having the same kind of middle term, such as, *A is either B or C* and *A is either B or D*, we can only have a conclusion which is a mere summary of the two propositions, e.g., *A is either B or C or D*. But from *A is either B or C* and *A is either D or not B*, we can draw the conclusion *A is either D or C*. This becomes apparent when we express the propositions as hypotheticals.

If A is not B, A is C

If A is not D, A is not B

∴ If A is not D, A is C = A is either D or C.

As the alternatives may occur in any order, the distinctions of figure are of no application.

(b) *Mixed Disjunctive Syllogisms*.—These are usually regarded as disjunctive syllogisms proper, and may be defined as *syllogisms in which, from a disjunctive major and a categorical minor, a conclusion is drawn which is either categorical or disjunctive*. In a *disjunctive proposition*, one or other of the alternatives is asserted to be true ; that is to say, if one of two alternatives is asserted to be false, the other may be asserted to be true. For example,

Either A is B, or C is D, Either the tax is heavy, or  
the people are unreasonable,

A is not B,

The tax is not heavy,

∴ C is D.

Therefore, the people are  
unreasonable.

If there are more than two alternatives, then the

denial of one of them implies the assertion of the truth of one or other of the other alternatives.

Either A is B, or C is D, or E is F,

A is not B,

$\therefore$  Either C is D, or E is F.

From the above it is clear that a disjunctive syllogism can be expressed as a hypothetical syllogism, if the disjunctive major is thrown into either of its two equivalent forms. The first of the above syllogisms may be expressed either in the form

If A is not B, C is D,

A is not B,

$\therefore$  C is D.

or in the form

If C is not D, A is B,

A is not B,

$\therefore$  C is D.

This equivalence between the hypothetical and the disjunctive syllogism settles the question whether the latter is to be regarded as mediate or immediate. If the hypothetical syllogism is regarded as mediate, the disjunctive syllogism must also be regarded as mediate.

The form of disjunctive reasoning described above has been called the *modus tollendo ponens* (the mood which, by denying, posits). There is another form of disjunctive reasoning in which the minor premise affirms one of the alternatives, and the conclusion denies the other. For example,



Either A is B, or C is D, Either John is dead, or he is  
alive,

A is B, John is alive,  
∴ C is not D. ∴ He is not dead.

This has been called the *modus ponendo tollens* (the mood which, by positing, denies). But this reasoning proceeds on the assumption that the alternatives of the disjunction are mutually exclusive. On the view, therefore, that they are not necessarily so, this form of disjunctive reasoning is not admissible. There are no doubt cases like the above in which the alternatives themselves are such as cannot be true together, *e.g.*, 'The general either loses the battle or wins it.' In such cases, both the forms of reasoning are valid, yielding four cases:—

- |   |                                     |
|---|-------------------------------------|
| (1) If the general loses the battle, he<br>does not win it. | } <i>modus ponendo<br/>tollens.</i> |
| (2) If the general wins the battle, he<br>does not lose it. |                                     |
| (3) If the general does not lose<br>the battle, he wins it. | } <i>modus tollendo<br/>ponens.</i> |
| (4) If the general does not win the<br>battle, he loses it. |                                     |

But it is clear that the inference in cases (1) and (2) is not from the disjunctive major, but from the categorical proposition implied in it, *viz.*, 'The general cannot both lose and win the battle.'

Again, when mere symbols are used, we have no means of knowing the nature of the alternatives, so that we must either regard them as in all cases mutually exclusive, or as not necessarily so. We have seen reasons to hold the latter view, and hence the *modus ponendo tollens* is not an admissible form.



4. The Dilemma.—A *dilemma* is an argument in which, from a compound hypothetical major premise, and a disjunctive minor the alternatives of which are either the affirmations of the antecedents of the major or the denials of its consequents, a conclusion is drawn *which either affirms the consequent or consequents, or denies the antecedent or antecedents*. We speak of a man as being “on the horns of a dilemma.” This means that there are only two alternative courses open to him, and that the adoption of either of them will be attended with some disagreeable consequence. There may also be three courses open, and then the argument is strictly a *Trilemma*; if four alternatives are offered, it is a *Tetralemma*; and if more than four, a *Polylemma*. Except for differences in the number of alternatives, these are essentially of the same nature as the dilemma, and hence we treat only of the latter. It is a mistake to suppose that according to the ordinary acceptation of the term, dilemma, the same conclusion must follow the adoption of either of the courses. The adoption of each course may lead to a distinct disagreeable consequence, so that the adoption of either of the courses implies the occurrence of either of the disagreeable consequences.

That there are only two alternatives open is always stated as the second premise of the dilemma; and the fact that if either alternative is adopted, or is true, some disagreeable result will follow, is always stated in some form as the first premise. But there is no special reason for this order. Some may even think that the reverse order is more appropriate. The essential feature of the dilemma being the disjunctive character of the minor premise, the antecedents of the compound hypothetical major or its consequents must be distinct in order that they may be

alternatives of the disjunction. When the minor premise disjunctively *affirms* the antecedents of the major, the dilemma is said to be *constructive*; and when it disjunctively denies the consequents, the dilemma is said to be *destructive*. Again, in a constructive dilemma, if the hypotheticals have the same consequent, the conclusion categorically affirms this consequent; and, in a destructive dilemma, if the hypotheticals have the same antecedent, the conclusion categorically denies this antecedent. In both these cases, the dilemma is said to be *simple*. If either the consequents of the constructive dilemma, or the antecedents of the destructive dilemma, are different, the conclusion is either a disjunctive affirmation of the consequents, or a disjunctive denial of the antecedents, and in both these cases the dilemma is said to be *complex*. We have thus four forms of dilemma:—

(1) *The Simple Constructive Dilemma.*

(a) If A is B, E is F; and if C is D, E is F.

Either A is B, or C is D.

∴ E is F.

If the king is a tyrant, he is in danger of being dethroned; and if he is unable to rule the kingdom, then also he is in danger of being replaced. But, either the king is a tyrant, or he is a fool. In any case, therefore, he is likely to be replaced by a better ruler.

(b) If A is B, either E is F or G is H; and if C is D, either E is F or G is H.

But either A is B, or C is D.

∴ Either E is F, or G is H.

The conclusion here is disjunctive, simply because the common consequent of the hypotheticals is disjunctive.

If a country is badly governed, its people must either live in poverty or quit it for foreign lands. If it is visited with famine, then too, they must live in poverty or quit it for foreign lands. But this country at present either suffers from bad government, or is visited with famine. Hence, the people must either live in poverty or migrate to foreign lands.

(2) *The Complex Constructive Dilemma.*

If A is B, E is F; and if C is D, G is H.

But either A is B, or C is D.

∴ Either E is F, or G is H.

If the state tampers with the prevailing religion, then its existence is unstable; and if, on the other hand, it strongly supports it, its laws must be changed so as to suit that religion. But this state is prone either to tamper with the prevailing religion, or to support it strongly. Therefore, either its existence is unstable, or its laws must be changed so as to suit the prevailing religion.

(3) (a) *The Simple Destructive Dilemma.*

If A is B, E is F; and if A is B, G is H.

But either E is not F, or G is not H.

∴ A is not B.

If the standard of the competitive examination is low, then the service suffers in efficiency, and the examination itself loses its value. But in the present instance, either the service does not suffer in efficiency, or the examination does not lose in value. Hence the standard is not low.

(b) If A is B and C is D, then E is F; and if A is B and C is D, then G is H.

But either E is not F, or G is not H.

∴ Either A is not B, or C is not D.

The conclusion here is merely a denial of the one single antecedent of the major, and hence the dilemma is not complex.

If mistakes are committed, and they are noticed, the Inspector writes a bad report; and under the same conditions, punishment is awarded to the students that commit them. But, in the present instance, either the Inspector does not write a bad report, or no punishment is awarded to any student. Hence, either mistakes are not committed, or they are not noticed.

(4) *The Complex Destructive Dilemma.*

If A is B, E is F; and if C is D, G is H.

But either E is not F, or G is not H.

∴ Either A is not B, or C is not D.

If the nobles of the realm are ambitious, then, the monarch is dethroned; and if they are rebellious, then, the Government of the country gets disorganised. Now, either the monarch is not dethroned, or the Government is not disorganised. Therefore, either the nobles are not ambitious, or they are not rebellious.

As in the case of Hypothetico-categorical syllogisms, the constructive form can be reduced to the destructive form, and *vice versa*. Taking the simple constructive form, and obverting the contrapositive of the major, we have

If E is not F, A is not B; and if E is not F, C is not D.

But either A is B, or C is D.

∴ E is F.

in the simple destructive form. Similarly, we can reduce any other form of the constructive dilemma into the corresponding form of the destructive dilemma, and *vice versa*.

Whately, Mansel and Jevons define a dilemma so as to exclude the *Simple Destructive form*. With them, the essential



feature of a dilemma is the presence of *two antecedents* in the major premise; but, as we have already pointed out, it is the presence of *two alternatives*, not two antecedents, that makes an argument a dilemma. Whately tries to show that the simple destructive syllogism which he rejects is nothing but a destructive hypothetical syllogism; for, as he says, the disjunctive denial of several consequents "comes to the same thing as *wholly* denying them, since if they be not *all* true, the *one antecedent* must equally fall to the ground." This argument seems to have force when the consequents of the hypothetical major are conjointly true when the antecedent is true, so that the denial of one of them is the denial of the whole. But in a destructive hypothetical syllogism, the information upon which the conclusion rests is *categorically* known, being the result perhaps of direct investigation or inquiry. But in the simple destructive dilemma, the consequents are alternatively denied, it not being known positively whether the one or the other is not true, though it is certain that one of them is not true. The object of the person that urges the dilemmatic argument is to make it impossible for the opponent to say that if a particular one of the consequents be false, then alone will the antecedent be false also. *Any* one of the consequents may turn out to be false (and one will surely be false), and then the antecedent will be false also. This is the fact that is emphasized in the dilemma. Similarly, in the simple constructive dilemma, *any* one of the antecedents may be positively known to be true, and then the truth of the consequent will follow. In fact, the simple constructive and the simple destructive are mutually convertible forms, and when one of them is universally accepted to be a dilemma, the other must be accepted as a dilemma also.

*Hamilton* defines a dilemma as "a syllogism in which the supposition (major) is at once hypothetical and disjunctive, and the sub-supposition (minor) sublates the whole disjunction, as a consequent, so that the antecedent is sublated in the conclusion." This contemplates chiefly the form,

If A is B, either C is D or E is F.

Neither C is D, nor E is F.

∴ A is not B.\*

*Ueberweg* regards as an essential feature of a dilemma the fact that the *same* conclusion must follow whichever of the alternatives may be true. If this is admitted, all the complex forms are excluded.

*Thomson* defines a dilemma as "a syllogism with a conditional (i.e., hypothetical) premise, in which either the antecedent or the consequent is disjunctive." This definition includes the following form, which is admittedly not a dilemma :—

If A is B, then C is D or E is F.

But A is B.

∴ C is D or E is F.

Jevons remarks that "dilemmatic arguments are more often fallacious than not, because it is seldom possible to find instances where two alternatives exhaust all the possible cases, unless indeed one of them be the simple negative of the other." An argument cannot be regarded as fallacious simply because one of the premises is false. The alternative premise may not exhaust all possible cases, but that cannot render the formal reasoning fallacious. But, from a material point of view, if the alternatives are not exhausted, the conclusion will not be convincing. Jevons gives the following example :—"If a pupil is fond of learning he needs no stimulus, and if he dislikes learning no stimulus will be of any avail; but he is either fond of learning or dislikes it; hence a stimulus is either needless or of no avail." It is here ignored that there are some who neither hate learning, nor are peculiarly fond of it. We can thus establish any conclusion by selecting those two alone of the possible alternatives which are in our favour.

A dilemma can be rebutted by an equally cogent dilemma to the opposite effect. An Athenian mother is said to have

\* This is strictly a destructive hypothetico-categorical syllogism.

addressed her son in the following words: "Do not enter into public business; for if you say what is just, men will hate you; and if you say what is unjust, the Gods will hate you." To this Aristotle is said to have suggested the following retort: "I ought to enter into public affairs; for if I say what is just, the Gods will love me; and if I say what is unjust, men will love me." The following may be given as another example: Protagoras is said to have undertaken to teach Euathlus how to plead causes in public Court for a reward half of which was to be paid at once, and the other half when Euathlus won his first cause. Euathlus, having engaged in no suit, refused to pay him the balance due. Protagoras sued him for the sum, and Euathlus appeared in his defence. Then, Protagoras said to Euathlus: "If you win the cause, you are bound to pay me by our agreement; if I win it, you are bound to pay me by the decision of the Court; in either case, therefore, you are bound to pay me the amount." Euathlus retorted thus: "If I win the cause, I am not to pay you by the decision of the Court; if you win it, I shall not have won a cause and therefore I am not to pay you by our agreement; in either case, therefore, I am not to pay you."

---

## CHAPTER V.

### *ABRIDGED SYLLOGISMS AND CHAINS OF REASONING.*

1. *Enthymeme*.—In epigrammatic and witty sayings, in ordinary conversation, and even in standard works, reasonings rarely fall in the regular syllogistic mould. We rarely find the two premises and the conclusion stated in proper order, and with logical precision. When, in ordinary conversation, one of the



premises or the conclusion can be suppressed without prejudice to clearness of expression, it is suppressed, as otherwise the argument would savour of scholastic pedantry. When a charge has to be *insinuated* and not made openly, it is done by means of an argument which suppresses one of its elements, particularly the conclusion. When, again, a person wishes to pass a specious argument for a cogent one, he generally suppresses the weak premise, and states the other premise and the conclusion in an emphatic and confident manner. Such mutilated syllogisms are called *Enthymemes*. Sometimes, the major premise is suppressed (and it is *implied* in what is explicitly stated), and then, the enthymeme is said to be of the *First Order*. "Iron has weight, because it is a material body" implies another statement "All material bodies have weight." Less commonly perhaps, the minor premise is suppressed, and then, the enthymeme is said to be of the *Second Order*. "Iron has weight, since all material bodies have weight" implies the minor premise, "Iron is a material body." The conclusion is sometimes suppressed, and then, the enthymeme is said to be of the *Third Order*. The following extract from the speech of Antony in Shakespeare's "Julius Cæsar" serves as an example:—

"You all did see that on the Lupercal  
I thrice presented him a kingly crown,  
Which he did thrice refuse: was this ambition?  
Yet Brutus says he was ambitious;  
And, sure, he is an honourable man."



Here, the orator dexterously insinuates that Brutus' declaration about Cæsar that he was ambitious is opposed to facts, and that as an honourable man he should not have made that charge. The whole speech is full of insinuations of this kind. "All material bodies have weight, and iron is a material body" implies "Iron has weight."

It must be noted that there may also be enthymemes in pure hypothetical and pure disjunctive arguments: e.g., "If local industries are encouraged, then, the people are happy, because in that case, the wealth of the country increases."

2. The Polysyllogism.—Sometimes we meet with a series of syllogisms connected together in such a manner that the conclusion of one stands as a premise of another, the conclusion of this again as a premise of a third, and so on. Such a chain is called a *Polysyllogism*. The one going before and furnishing a premise for the succeeding syllogism is called a *Prosyllogism*, and the one coming after is called an *Episyllogism*.

D is B — All men are fallible.	} Prosyllogism.
∴ C is D — All kings are men.	
∴ C is B — All kings are fallible.	
but A is C — George is a king.	} Episyllogism.
∴ A is B — George is fallible.	

The student will see that, if the chain be continued further, the same syllogism will be both a prosyllogism and an episyllogism. The prosyllogism may also furnish

the minor premise for the succeeding syllogism as in the following :—

D is C — All kings are men.	} Prosylogism.
A is D — George is a king.	
∴ A is C — ∴ George is a man.	} Episylogism.
but C is B — but All men are fallible.	
∴ A is B — ∴ George is fallible.	

It must be noted that in such chains of reasoning, the progress of thought may be either from prosyllogism to episylogism as in the above examples, or from episylogism to prosyllogism. The former is the natural order adopted when, being in possession of certain general principles, we follow them out in all their consequences which are of decreasing scope or generality. This method of arguing in a chain from the highest principles to their last consequences is called *Progressive, Synthetic* or *Episylogistic* argument. The latter is the natural order when, having a thesis to prove, we seek the general principles under which it may be subsumed; *i.e.*, the conclusion is given first, and we pass back by successive steps of proof to the premises on which it may be based. This method of reasoning backwards in a chain is called *Regressive, Analytic*, or *Prosylogistic* reasoning. *All A is B, because All C is B and All A is C; and All A is C, because All D is C and All A is D; and All A is D, because All K is D and All A is K, &c.*

**3. The Epicheirema.**—*If one or more of the syllogisms composing a polysyllogism are enthymematic, then the syllogism is called an Epicheirema.*

C is B, because it is D.—All kings are fallible,  
because they are men.

A is C —George is a king.

∴ A is B. ∴ George is fallible.

This has been called a *Single Epicheirema*, because reason is given enthymematically only for one of the premises. If both the premises are supported by reasons enthymematically, then it is called a *Double Epicheirema*; for example,

All S is P, because it is R.

All M is S, because all Q is S.

∴ All M is P.

It is erroneous to speak of the *Epicheirema* as an essentially regressive syllogism if, as is usually the case, the above are accepted as examples; for, in them, we see the argument is only partly regressive.

4. *The Sorites*.—A *sorites* is defined to be a connected series of syllogisms (a polysyllogism) with all their conclusions dropped except the last. It is a series of enthymemes, the first enthymeme being of the third order, and the last either of the first or second order. The intermediate enthymemes are represented each by one premise only, the conclusion of the preceding syllogism being the other premise. Two kinds of sorites are generally mentioned, the Aristotelian, and the Goclenian. In the Aristotelian Sorites, the subject of the conclusion is the subject of the first premise, and the predicate of the conclusion is the predicate of the last premise. In the Goclenian Sorites, however, the reverse is the case, the subject of the conclusion being the subject of the last premise, and the predicate of the conclusion being the predicate of the first premise.

*Aristotelian Sorites.\**

- Example :—(a) A is B  
                   B is C  
                   C is D  
                   D is E  
                    $\therefore$  A is E.

*Goclenian Sorites.*

- Example :—(b) D is E  
                   C is D  
                   B is C  
                   A is B  
                    $\therefore$  A is E.

In the Aristotelian Sorites, again, the conclusion of each syllogism is the minor premise of the succeeding syllogism, while in the Goclenian Sorites it is the major premise. The following analyses of the two kinds of sorites bring out the points of difference between them :—

(a)	B is C	C is D	D is E
	<u>A is B</u>	<u>A is C</u>	<u>A is D</u>
	$\therefore$ A is C	$\therefore$ A is D	$\therefore$ A is E
(b)	D is E	C is E	B is E
	<u>C is D</u>	<u>B is C</u>	<u>A is B</u>
	$\therefore$ C is E	$\therefore$ B is E	$\therefore$ A is E

\* Though Aristotle refers to the chain of reasoning here defined and exemplified, he does not use the name *Sorites* to denote it. The stoics are said to have first distinctly expounded this form of reasoning, and Cicero is said to have given the name *Sorites* to it. The Goclenian Sorites received its name from one Goclenius who first expounded it. Ancient writers used the name *Sorites* ( $\sigma\omega\rho\acute{\iota}\varsigma$  a heap) to denote a particular sophism, based on the difficulty



From this analysis it is clear that two rules apply to the Aristotelian Sorites, and two to the Goodenian Sorites.

*The special rules of the Aristotelian Sorites.*

(1) *Only one premise can be negative, and that must be the last.* If, in the above form of sorites, the first and the third were both negative, then the conclusion of the first syllogism will become negative, and thus the two premises of the second syllogism turn out to be negative, which is absurd. Again, the conclusion which must necessarily be negative if one of the premises be negative, distributes its predicate E. In order that E may be distributed in the premises, the fourth and last premise which contains the term as the predicate, must be negative.

(2) *Only one of the premises can be particular, and that must be the first.* If there were two particular premises, then we should light upon two particular premises in one of the component syllogisms, which will give us no conclusion. Again, if the third premise, instead of the first, were particular, then in the

---

of assigning an exact limit to a notion :—" Does one grain of corn make a heap ? " " No. " " Do two ? " " No. " " Do three ? " " No. " Thus you may go on increasing the number by unity till your antagonist either admits that what was not a heap with a certain number of grains suddenly becomes a heap when one more grain is added to it, or denies the name heap to a pile of corn however enormous it may be. A similar sophism termed *Calvus* began with the question whether pulling one hair from a man's head made him bald. Similarly, on what day does a kitten become a cat ? Sorites in this sense is also called *sophisma polyretescos*, or fallacy of continuous questioning.

second syllogism, we commit the fallacy of undistributed middle. Similarly, it can be shown that no other premise except the first can be particular. Or, briefly, since all the premises except the last are affirmative, and as such do not distribute their predicates, the first premise alone can be particular.

*The special rules of the Goclenian Sorites.*

(1) *Only one premise can be negative and that must be the first*; for, if more than one premise were negative, as the conclusion of each syllogism is a premise of the succeeding syllogism, we should, as in the case of the Aristotelian Sorites, come upon a syllogism with two negative premises. Again, if one premise were negative, the conclusion would be negative; hence its predicate which is distributed occurring as the predicate of the first premise, this last must be the negative premise supposed.

(2) *Only one premise can be particular and that must be the last*; for, if more than one premise were supposed to be particular, we should, in the analysis, come upon a syllogism with two particular premises; and if any but the last were particular, we should somewhere commit the fallacy of undistributed middle.

The following material example may be given of Aristotelian Sorites:—The modern day social reformers attempt to introduce changes suddenly; those that attempt to introduce changes suddenly ignore the wholesome lesson of past history that gradual change is to be preferred to revolution; those that are ignorant of this lesson do more

harm than good by their interference; and those that do harm by their interference deserve condemnation from their fellows. Therefore, the modern day social reformers deserve condemnation from their fellows. If the order of these premises is reversed, we get an example of the Goclenian Sorites. We may also have sorites wholly composed of hypothetical propositions. The following is in the Aristotelian form:—If war is declared, the agriculture of the land and the various industries suffer; if agriculture and the industries suffer, then wealth diminishes; if wealth diminishes, the staying power of the land in times of famine also diminishes; and if the staying power in times of famine diminishes, contribution must be sought from richer lands. Therefore, if war is declared, contribution must be sought from richer lands. In the place of this conclusion we may have the categorical premise, war has been declared, and then the conclusion will be, contribution must be sought from richer lands. Or, the categorical premise may be, contribution is not sought from richer lands, and then, the conclusion will be, war has not been declared. In either case, the last episyllogism being a hypothetico-categorical syllogism, we have to regard the suppressed conclusion of the preceding prosyllogism as the major premise of that syllogism, and not as the minor as in the case of the other component syllogisms. The student will see that this is not necessary in the case of the Goclenian form.

It will be noted that the component syllogisms of both forms of sorites are in Fig. 1. But the first or last syllogism of a sorites may be in Fig. 2 or 3. For example, *A is B, B is C, C is D, D is E, F is not E, therefore A is not F*; or again *Some M is A, M is B, B is C, C is D, D is E, therefore, Some A is E*. But Dr. Keynes gives examples to show that it is

possible to have a sorites of which the component syllogisms are all in Fig. 2 or 3.

For example,

Some S is not  $M_1$ ,  
 All  $M_2$  is  $M_1$ ,  
 All  $M_3$  is  $M_2$ ,  
 All  $M_4$  is  $M_3$ ,  
 All P is  $M_4$ .

Therefore Some S is not P.

This can be analysed into the following syllogisms:—

- |                         |                         |
|-------------------------|-------------------------|
| (1) All $M_2$ is $M_1$  | (2) All $M_3$ is $M_2$  |
| Some S is not $M_1$     | Some S is not $M_2$     |
| ∴ Some S is not $M_2$ . | ∴ Some S is not $M_3$ . |
| (3) All $M_4$ is $M_3$  | (4) All P is $M_4$      |
| Some S is not $M_3$     | Some S is not $M_4$     |
| ∴ Some S is not $M_4$ . | ∴ Some S is not P.      |

"All the resulting syllogisms are in Fig. 2 and in the mood *Baroco*. It is analogous to the Aristotelian Sorites, the subject of the conclusion appearing in the premise stated first, and the suppressed premises being all *minors* in their respective syllogisms."

Again,

Some  $M_4$  is not P,  
 All  $M_4$  is  $M_3$ ,  
 All  $M_3$  is  $M_2$ ,  
 All  $M_2$  is  $M_1$ ,  
 All  $M_1$  is S,

therefore Some S is not P

can be analysed into the component syllogisms in *Bocardo*.

- |                          |                          |
|--------------------------|--------------------------|
| (1) Some $M_4$ is not P, | (2) Some $M_3$ is not P, |
| All $M_4$ is $M_3$ ,     | All $M_3$ is $M_2$ ,     |
| ∴ Some $M_3$ is not P.   | ∴ Some $M_2$ is not P.   |
| (3) Some $M_2$ is not P, | (4) Some $M_1$ is not P, |
| All $M_2$ is $M_1$ ,     | All $M_1$ is S,          |
| ∴ Some $M_1$ is not P.   | ∴ Some S is not P.       |



This is "analogous to the Goclenian Sorites, the predicate of the conclusion appearing in the premise stated first, and the suppressed premises being *majors* in their respective syllogisms."

Dr. Keynes does not maintain that such reasonings in Figs. 2 and 3 occur in common use, but merely constructs them from theoretical interest.

## CHAPTER VI.

### MODERN ADDITIONS TO THE SYLLOGISTIC FORMS.

1. Those arising from the quantification of the Predicate.—We have seen that Sir W. Hamilton, by quantifying the predicate, recognises four additional forms of proposition. On the basis of this eight-fold scheme, he works out a theory of the syllogism which, while it appears to be simple from one point of view, embraces more than a hundred valid moods most of which are unnatural and uncouth in form.

When the predicate of a proposition is quantified, the proposition reduces itself to an equation, it then being immaterial which term is read as subject and which as predicate. When this distinction becomes of no importance, the distinctions of figure which are based upon the positions of the terms in the premises, must also vanish. Hence Hamilton recognises *Unfigured Syllogisms* as well as *Figured Syllogisms*, in the former of which the relation of subject and predicate is not recognised. We have already given his canon for the Unfigured Syllogism as well as his canon for the Figured Syllogism. It is difficult to understand how, when the distinction of subject and predicate is abolished, any Figured Syllogism can be recognized, since every mood which is valid in any one figure must be

valid in all, as by simple conversion it can be written in any other figure. We may perhaps suppose that Hamilton retained it for the reason that arguments which are naturally expressed in a particular form will sound unnatural and harsh when expressed in other forms. Granting, then, the necessity of the Figured Syllogism, we find that the process of reduction is simplified, as *simple conversion* alone is enough to express one form of argument in any other form. The special rules for the several figures are not necessary as they are intended to secure the proper distribution of terms in the syllogism. For example, UEE is valid in the first figure, as the quantified predicate of U avoids illicit major.

All M is all P  
No S is any M  
∴ No S is any P.

Thus, the rule that the minor must be affirmative in the first figure becomes unnecessary. Similarly the rule of the second figure that one of the premises must be negative is also needless.

Some P is all M  
All S is all M  
∴ All S is some P.

On the ground, then, that the process of conversion is simplified, that reduction is simplified, and that the rules of distribution are unnecessary, Hamilton claims for his theory unity and simplicity. But when we come to the number of moods rendered necessary by his doctrine, we find that it is enormously multiplied. The only two rules that need be observed, according to Hamilton, in determining the valid moods are, firstly, that from two negative premises we cannot have any conclusion, and, secondly,

that the middle term must be distributed in the premises so as to make the sum of its quantifications in both of them exceed its total extent.\* Applying these rules to the combinations formed of eight propositional forms taken three at a time, and disregarding figure, we find that, excluding subaltern moods, 12 affirmative moods are valid. As either premise of each of these moods can be a negative proposition, we get 24 negative moods corresponding to these 12 affirmative moods. These 36 moods are valid in all the figures; and as Hamilton recognises the first three figures without the last, we have 108 valid moods in all the three figures. Thomson who adopts only two (U & Y) of the four additional propositional forms rejects as useless though possible varieties, 14 moods in the first figure, 16 in the second, and 16 in the third. He thus reduces the number to 62.

Many of these forms are not of any practical importance, nor are they useful as a means of mental discipline. In fact, propositions with quantified predicates are not in common use, and sound harsh and unnatural to the ear. UUU for example, has no counterpart in nature, unless the terms express one and the same thing. It is difficult to find two such propositions to constitute the premises of a syllogism with a view to obtaining a conclusion from them. There is no mental discipline of any kind, as the conclusion is obtained in the Figured Syllogism by merely taking between the minor and the major what worse relation subsists between the terms in the premises.

2. Syllogisms in Extension and in Comprehension.—Another defect which Hamilton points

---

\* We shall consider this rule again under De Morgan's theory of the syllogism.



out in the Aristotelian syllogism is, that it is read only in Extension, and not in Comprehension also. Every proposition expressing a relation of whole and part both in Extension and in Comprehension, every syllogism which is composed of propositions must be viewed in both the aspects likewise.

Every morally responsible agent is a free agent ; M is P.  
 Man is a morally responsible agent ;                      S is M.  
 Therefore, man is a free agent.                              ∴ S is P.

This is the aspect in extension, and supposes that P is the largest term and S is the smallest term. But in the reading in comprehension, this relation of S and P is reversed, since the smallest class is marked by the largest number of attributes, and *vice versa*. Hence, the minor premise is stated first because it is now the major premise as it contains the term connoting the largest number of attributes. The following is the reading in Comprehension:—

Man is a responsible agent ;                      S is M.  
 But a responsible agent is a free agent ; M is P.  
 Therefore, man is a free agent.                      ∴ S is P.

But this change in the order of the premises does not definitely indicate that the syllogism is viewed in comprehension. Hence the form usually adopted for comprehension is: S contains M ; M contains P ; therefore, S contains P. The attributes of a man contain the attributes of a responsible agent ; the attributes of a responsible agent contain the attributes of a free agent ; hence the attributes of a man contain the attributes of a free agent. Thus, the meaning of the copula in syllogisms in comprehension is "contains," and its meaning in those in extension is "is contained under."



*In Comprehension.*

S contains M

M contains P

 $\therefore$  S contains P.*In Extension.*

M is contained under P.

S is contained under M.

 $\therefore$  S is contained under P.

The first objection to this scheme of double syllogisms is, that whether a syllogism is viewed in the quantity of extension or in that of comprehension, the argument, as Hamilton himself admits, is essentially the same. No doubt the fundamental meaning of any syllogism is its meaning in intension or connotation. The fundamental meaning of Hamilton's example in extension is—that the attributes connoted by the term, responsible agent, accompany those connoted by the term, free agent; that the attributes connoted by the term, man, accompany those connoted by the term, responsible agent; and that, therefore, the attributes connoted by the term, man, accompany those connoted by the term, free agent. But this is not the form adopted in common use. The form of Extension, that is, of inclusion and exclusion of classes, is the form occurring in common use. Though it is not psychologically the most prominent, yet, at any rate, as Dr. Bain says, it is a more concrete and intelligible form. It cannot, however, be regarded as in any way essentially different from the other form. Referring to it, Dr. Bain says (p. 181):—"We do not think of this form justly, correctly, unless we conceive the terms as determined by their *connotation*. The extent is bounded solely by the intent..... When we speak of a class, we do so in a figurative manner; we suppose an actual array of individuals when there is no such array; there being only the defining mark, the connotation of them, to define them whenever they appear. The extent of 'man' is the imaginary aggregate of all objects agreeing in the marks connoted

by the term, the defining characteristics of man; if we lose sight of this condition for a moment, we have nothing fixed in our grasp. Accordingly, comprehension is inseparable from extension in every case; it is an ever-present fact, without our topsy-turvyng the syllogism, or constituting a parallel array of moods to match the moods in extension.....It is the power behind the throne, even when extension is the ostensible reigning circumstance."

The Fourth Figure is rejected by Hamilton as a hybrid, the premises having reference to comprehension, and the conclusion having reference to extension. He says that if the premises had reference to extension as well as the conclusion, then the conclusion should be *P is S* and not *S is P*.

P is M  
M is S  
∴ *S is P*.

Here, if P were said to be contained under M, and M under S, then, in the conclusion P should be stated to be contained under S. But, as a matter of fact, the conclusion states that S is contained under P, *i.e.*, that S is a smaller term than P as regards extent, while in the premises it is conceived as the larger term. This account of the matter is not correct. We do not say in the conclusion *All S is P*, but only *Some S is P* which may still leave S the larger term.

3. Syllogisms derived from full recognition of contraries.—The late Professor De Morgan has, by recognising contrary terms, vastly extended the syllogistic theory. He does not recognise distinctions of figure, but, retaining the same positions of the terms, investigates all

the possible combinations of premises which can yield valid conclusions. He adopts the following convention. "Let  $X$  and  $Z$  be the terms of the conclusion; and let  $Y$  be the middle term. Let the premise in which  $X$  and  $Y$  are compared come first of the two. Let the order of reference in each case be that of the alphabet,  $XY$ ,  $YZ$ ,  $XZ$ . So that by stating what  $X$  is with respect to  $Y$ , and what  $Y$  is with respect to  $Z$ , our syllogism involves the statement of what  $X$  therefore must be, or therefore cannot be, with respect to  $Z$ ." [This means that the minor premise should come first, and the major, next.]

Now, he recognises not merely  $X$ ,  $Y$ ,  $Z$ , but also their contraries denoted by the small letters  $x$ ,  $y$ ,  $z$ ; so that the possible combinations of threes which can enter into such syllogisms as terms are eight in number:—

$XYZ$ ,  $xYZ$ ,  $xyZ$ ,  $xyz$ ,  $XYz$ ,  $Xyz$ ,  $xYz$ ,  $XyZ$ .

The contraries being denoted by separate symbols, all negations are exhibited as affirmations. If now we find out the possible combinations of affirmative premises that can yield valid conclusions, apart from any cognizance of contrary terms, *i.e.*, if we find out all the affirmative modes of inference, we can apply each of these modes to all the eight combinations of propositions given above, which will give us all the possible valid syllogisms. No doubt all these valid syllogisms will appear as affirmative syllogisms; but when  $x$ ,  $y$ ,  $z$  are read as the contraries of  $X$ ,  $Y$ ,  $Z$ , the proper expressions of those syllogisms will be determined. The possible combinations of affirmative premises that can yield valid conclusions are:—

(1) All  $X$ s are  $Y$ s

All  $Y$ s are  $Z$ s

$\therefore$  All  $X$ s are  $Z$ s.

(2) Some  $X$ s are  $Y$ s

All  $Y$ s are  $Z$ s

$\therefore$  Some  $X$ s are  $Z$ s.



- (3) Some Xs are all Ys\*      (4) Some Xs are all Ys\*  
       Some Ys are Zs                All Ys are Zs  
        $\therefore$  Some Xs are Zs.                 $\therefore$  Some Xs are Zs.

The first is *Barbara* with the minor premise stated first, and is the unit syllogism. The second is *Darii*, with the premises similarly transposed, *the minor being particular*. The third is *Disamis*, with a similar change of premises, *the major being particular*, and the universal term of A being the predicate of the proposition instead of its subject in conformity with the conventional order of the terms in a syllogism. The fourth is the above with the middle term distributed twice but yielding no stronger conclusion. It corresponds to *Darapti*. *Datisi* and *Dimaris* are the same as (2) and *Bramantip* is the same as (1) with the conclusion weakened owing to a different order of the terms, and hence called by the author a weakened universal. When each of these four modes of inference is applied to the eight combinations of terms, we get 32 valid syllogisms.

(1) When the unit syllogism is applied to the eight combinations, and x, y and z are read as the contraries of X, Y and Z, we shall get the eight forms of *universal* syllogisms. Thus, applying it to the combination of xYz, we get the following syllogism:

All xs are Ys = All not-Xs are Ys = No not-Xs are not-Ys.

All Ys are zs = All Ys are not-Zs = No Ys are Zs.

$\therefore$  All xs are zs = All not-Xs are not-Zs = All Zs are Xs.

which again equals { Everything is either X or Y.  
                                   No Ys are Zs.  
 $\therefore$  Some Xs are all Zs.

(2) If we apply the second type to the eight combinations, we get what the author calls the eight forms of *universal-particular syllogisms* (particular conclusion with these two.

\* This form of conversion is recognised by De Morgan.



or the first premise particular). Thus, applying it to  $xyZ$ , we get the following syllogism:—

Some  $x$ s are  $y$ s = Some not- $X$ s are not- $Y$ s = Some things are  
neither  $X$ s nor  $Y$ s.

All  $y$ s are  $Z$ s = All not- $Y$ s are  $Z$ s = Everything is either  
 $Y$  or  $Z$ .

∴ Some  $x$ s are  $Z$ s = Some not- $X$ s are  $Z$ s = *No  $X$ s are some  $Z$ s.*

(3) Applying the third type, we get eight *major-particular* syllogisms (particular conclusion with the major or second premise particular).

(4) Applying the fourth, we get eight *strengthened particular syllogisms* (universal premises with particular conclusion). A strengthened syllogism is one whose premises are stronger than they need be to bear out the conclusion.

The twenty-four syllogisms obtained by applying the first three cases are called fundamental syllogisms, *i.e.*, syllogisms in which neither of the premises "is stronger than is necessary to produce the conclusion." The remaining eight syllogisms are strengthened syllogisms. These are also obtained from the sixteen fundamental particular syllogisms by strengthening (or rendering universal) the middle term of the particular premise in each syllogism, or, in De Morgan's language, by strengthening either the *second*\* form of the first premise, or the *first*\* form of the second premise. This strengthening does not affect the distribution of the extreme terms in the conclusion. If, <sup>de</sup> <sub>premise</sub> however, either the first form of the first premise or the <sub>premise</sub> <sup>de</sup> second form of the second premise is strengthened, the

(1)

∴ "A  $X$  is  $Y$ " is the first form of the particular premise, and  
"A  $X$ " is the second form.

conclusion is also strengthened, and the syllogism becomes universal. Thus, the types,

Some Xs are Ys	Some Xs are all Ys
<u>All Ys are Zs</u>	<u>Some Ys are Zs</u>
$\therefore$ Some Xs are Zs	$\therefore$ Some Xs are Zs

become by this process

Some Xs are all Ys	Some Xs are all Ys
<u>All Ys are Zs</u>	<u>All Ys are Zs</u>
$\therefore$ All Xs are Zs.	$\therefore$ Some Xs are all Zs.

Again, if P and Q *together* prove R, then the denial of R must necessarily be the denial of one at least of P and Q. Hence, P being affirmed and R denied, the denial of Q must follow; and Q being affirmed and R denied, the denial of P must follow. In other words, in every syllogism, *either premise joined with the contrary (or contradictory) of the conclusion gives the contrary of the other premise.* These are called *opponent* forms. There are two opponent forms to every syllogism. And the syllogisms may be so grouped in threes, that each one of any three may have the two others for opponents.

The rules of inference are:—

- (1) All pairs of universals are conclusive.
- (2) When one of the premises is universal and the other particular, the middle term must also be a universal and a particular, i.e., universal in one premise and particular in the other.
- (3) A universal conclusion follows only from universals with the middle term differently quantified in the two.
- (4) From two particulars nothing can be inferred.

(5) Premises of *like* quality give an affirmative conclusion ; of *different* quality, a negative conclusion.

De Morgan compares his own system with the Aristotelian, of which he regards it as an extension, due to the device of embracing 'contrary' terms. The Aristotelian syllogisms may all be collected from his system by (1) excluding 'contrary' terms and everything involved by them, (2) treating the simple converses of E and I (called by De Morgan 'second forms') as distinct forms, of themselves determining figure and mood, (3) excluding the form of conversion, 'Some Xs are all Ys,' (4) introducing the distinctions of figure, and (5) reversing the order of the premises. Again, in the Aristotelian scheme, there are fifteen fundamental syllogisms, four in the first figure, four in the second, four in the third, and three in the fourth. Each of the three fundamental syllogisms of the fourth figure (*Dimaris*, *Oamenes*, *Fresison*) has the two others for its *opponents*. The remaining twelve syllogisms can be arranged in four groups, each group consisting of one syllogism from the first figure, one from the second, and one from the third, so that each of every group has the two others for its *opponents*. There are three strengthened particular syllogisms, *Darapti*, *Felapton* and *Fesapo*, and one weakened universal, *Bramantip*.

Some of the Aristotelian rules are out of place in De Morgan's system. The rule that the middle term must be distributed once at least in the premises must be replaced by the first two rules mentioned above. The rule that from two negatives nothing can be inferred, also fails. There are eight such syllogisms in the enlarged scheme. But De Morgan himself remarks: "But a pair of negative premises never conclude with both terms of the premises,



but with the contrary of one or both, and this must be substituted, as a rule of conclusion, for the one just named." This means that one of the premises is only negative in appearance, and the conclusion which is affirmative in form, is in reality negative. On the rule forbidding two particular premises, De Morgan brings forward the following as a valid inference: Most Ys are Xs; Most Ys are Zs; therefore, Some Xs are Zs. Most men are poor, most men are insincere, therefore, some poor men are insincere. He develops this form at length into a symbolical scheme under the name of 'The numerically definite syllogism.'

4. The Numerically Definite Syllogism.—If there are 100 M's, and we know that each of 60 S's is an M and each of 70 M's is a P, we can draw the conclusion, each of 30 S's is a P; for, even supposing that all the remaining 40 M's which are not S's are P's, since there are 70 M's which are P's, 30 M's at least must be of the S's. Here, 60 and 70 are called the *effective* numbers, and their sum exceeds the total number of M's by 30. Similarly, if there are 100 M's, and we know that each of 80 S's is an M and no one of 30 P's is any one of 40 M's we can draw the conclusion, no one of 20 M's is any one of 30 P's; for, taking the 20 M's which are not S's, as not being any one of the 30 P's, 20 more such M's have to be sought and they can only be of those which are S's. Here, 80 and 40 are the effective numbers, and their sum exceeds the total number by 20. Thus, the rules of inference are: (1) The premises must not be both negative, (2) The sum of the effective numbers in the two premises must be greater than the whole number of existing cases of the middle term.



Such syllogisms with numerically definite terms rarely occur, however, in common use. But there is one term which is of tolerably frequent occurrence, and that is, 'most,' which means 'more than half.' 'Most of the crew were officers, most of the crew perished, therefore, some officers perished.' This is of the form of a numerically definite syllogism and is valid. Thus, when *most* is admitted as a sign of particular quantity, and understood to mean 'more than half,' then as De Morgan points out, the Aristotelian rule that from two particular premises nothing can be inferred fails. The only condition that is required in such cases for valid inference is that the two premises together affirm or deny of more than all the instances. Hamilton gives the following modification of the rule: "The quantifications of the middle term, whether as subject or predicate, taken together, must exceed the quantity of that term taken in its whole extent." In other words, as Dr. Keynes puts it, we must have an *ultra-total distribution* of the middle term in the two premises taken together.

It may not be out of place here to refer to certain arguments which are not essentially syllogistic, but which are nevertheless valid. The argument *afortiori* is one such. A is greater than B, B is greater than C, therefore, A is greater than C. Other arguments are:—A is the brother of B, B is the brother of C, therefore, A is the brother of C; A equals B, B equals C, therefore, A equals C; A is a contemporary of B, B is a contemporary of C, therefore, A is a contemporary of C; A is fastened to B, B is fastened to C, therefore, A is fastened to C. In all these cases, it will be seen that there are four terms, and hence the arguments cannot be called syllogisms. But attempts have been made to show that they

are reducible to syllogistic forms, and that syllogism is therefore the typical form of all inferences. The argument *a fortiori* is exhibited thus:—

B is greater than C,  
therefore, whatever is greater than B is greater than C,  
but A is greater than B,  
therefore, A is greater than C.

With De Morgan, Dr. Keynes considers this as an evasion, or as a *petitio principii*. He says that the principle of the argument *a fortiori* is really assumed in passing from *B is greater than C* to *whatever is greater than B is greater than C*. He contends that this principle ought to be regarded as something distinct from the *Dictum* and not as subordinate to it. He enunciates it thus: *Whatever is greater than a second thing which is greater than a third thing is itself greater than that third thing*. Similar principles may be enunciated, he says, for other arguments not coming under the syllogism, and all these principles are as self-evident as the *Dictum* itself in the particular systems to which they belong. He points out that the treatment of all such valid formal inferences not coming under the syllogism may be appropriately considered by what has been called the *logic of relatives*. The function of the logic of relatives is to "take account of relations generally, instead of those merely which are indicated by the ordinary logical copula *is*" (Venn, *Symbolic Logic*, p. 400). De Morgan is also dissatisfied with the vague and uncertain use of the syllogistic copula, and recommends the admission into Logic of relation in general, and of the composition of relation, in order to make logic more in alliance with ordinary thinking. The axiom of his logic, as we have already pointed out, is "The relation of a relation is a relation compounded of the two."

On the other hand, Whately, Spalding, Mansel and J. S. Mill are of opinion that all valid formal inference can be exhibited in some mood or other of the syllogism.

---

## CHAPTER VII.

### *FUNCTIONS AND VALUE OF THE SYLLOGISM.*

The value of Syllogistic Logic, according to the intention of its founder, consists in its furnishing us with rules for unfolding whatever is implicated in certain given premises. It is the Logic of formal or consistent thinking. When the premises are granted, the conclusion follows as a matter of course. It does not advance beyond the premises. This has been regarded as the peculiar merit or excellence of the syllogism. The same fact, however, has been viewed in a different light. It has been said that mere repetition is not inference. There must be something new in the conclusion.

A far more serious charge, the charge of *petitio principii*, has been brought forward against the syllogism. It is argued that without previously knowing that *Socrates is mortal*, we have no right to say that *All men are mortal*. The major premise of the syllogism thus assumes the conclusion. Mill accepts the charge\* but takes a view of the syllogism which

---

\* Not certainly on the ground that he believes that the major premise points to the particular case by name, but on the ground that it points to it by character. He distinctly says so in a footnote:—"It is hardly necessary to say, that I am not contending for any such absurdity as that we *actually* 'ought to have known'

rescues it from the charge. He subordinates it to Induction, viewing it as a collateral security for the correctness of the inductive generalization. He says that the major premise is constituted by an observed part and an inferred part, the observed part alone forming the evidence for the conclusion, and the inferred part being merely shadowed forth by character and not referred to by name. When thus you regard the particulars comprised in the major premise as the real evidence for the conclusion, the *petitio principii* vanishes. In the use to which the syllogistic art was applied by the more earnest thinkers of the Aristotelian period, there is no doubt some justification for this view.† They used it for the purpose of filling their minds with material truths, by taking them in the first instance for granted and noting by a series of syllogistic arguments if they are led to any absurd consequences by such acceptance. Mill's view is stated as follows:—

“All inference is from particulars to particulars. General propositions are merely registers of such inferences already made, and short formulæ for making more: The major premise of a syllogism, consequently, is a formula of this description: and the conclusion is not an inference drawn

---

and considered the case of every individual man, past, present and future, before affirming that all men are mortal: although this interpretation has been, strangely enough, put upon the preceding observations.” He does not attach any serious scientific value “to such a mere salvo as the distinction drawn between being involved by *implication* in the premises, and being *directly asserted* in them.” In any case, he thinks there is *petitio principii*.

† *Vide* Introduction, History of Deductive Logic.



from the formula, but an inference drawn *according to* the formula: the real logical antecedent, or premise, being the particular facts from which the general proposition was collected by induction. Those facts, and the individual instances which supplied them, may have been forgotten; but a record remains, not indeed descriptive of the facts themselves, but showing how those cases may be distinguished, respecting which, the facts, when known, were considered to warrant a given inference. According to the indications of this record we draw our conclusion; which is, to all intents and purposes, a conclusion from the forgotten facts. \*\*\*\*\* Though there is always a process of reasoning or inference where a syllogism is used, the syllogism is not a correct analysis of that process of reasoning or inference; which is on the contrary (when not a mere inference from testimony) an inference from particulars to particulars, authorized by a previous inference from particulars to generals, and substantially the same with it; of the nature, therefore, of Induction. But while the conclusions appear to me undeniable, I must yet enter a protest against the doctrine that the syllogistic art is useless for the purposes of reasoning. The reasoning lies in the act of generalization, not in interpreting the record of that act; but the syllogistic form is an indispensable collateral security for the correctness of the generalization itself. \*\*\*\*\* The value therefore of the syllogistic form, and of the rules for using it correctly, does not consist in their being the form and the rules according to which our reasonings are necessarily, or even usually made; but in their furnishing us with a mode in which those reasonings may always be represented, and which is admirably calculated, if they are inconclusive, to bring their inconclusiveness to light." We shall now examine what truth there is in Mill's position.

*Truth in Mill's position.*—That the syllogism involves a *petitio principii* when the major premise is understood as a mere summation of particulars, there is no doubt. If we have no

right to conclude that "all horned animals ruminate" unless we have previously examined each and every horned animal to be a ruminating animal also, then we cannot advance the general proposition in proof of any particular case. In fact, if all the particulars have been examined, then the syllogism is useless. While discarding this view that the major premise is a mere summation of particulars, Mill still holds that there is a *petitio principii* in the syllogism so long as you consider it as an argument to prove the conclusion. If the major premise is regarded as constituting by itself the real evidence for the conclusion, Mill points out that there is a *petitio principii* necessarily involved in it even though it is recognised as a general principle deduced from only a number of observed cases. Taking the major premise to be such a general principle, the question arises, what is its probative force? In answering this question two parts of the principle should be distinguished, the inferring part and the registering part. "The results of many observations and inferences, and instructions for making innumerable inferences in unforeseen cases, are compressed into one short sentence." The proving capacity belongs only to the former and not to the latter. If the major premise as a whole comprising (though by character) both sets of instances is regarded as having probative force in all its parts, then in proving one of the latter set of instances by the premise, we are assuming the very thing to be proved. The *universal form* of the proposition should not mislead us into supposing that by itself it is adequate to prove anything. It is only "an allegation respecting a certain number with a power of including others as they come on the stage."

Mill finds that he cannot countenance the view that the general principle, *apart from the particulars on which it rests*, has any proving efficacy. And to convey this import, he says that from the general principle nothing can be inferred except those particulars which the principle itself assumes as known. It is his point not only to emphasize the fact that it is possible

to infer to particulars without a *distinct* apprehension of the resemblance, but also to emphasize the fact (which is allied to the former) that the absolute separation of the general principle from the particular instances which gave it its being, and the employment of that principle for the purposes of proof, are impossible. When separated from the particular instances upon which it rests, and viewed as of *absolute necessity*, the general principle is apt to be regarded as constituting a sure basis for further proof. This possibility Mill denies, and in his anxiety to see that the particular instances from which the general principle is obtained are not ignored maintains that the general principle as such, if it can prove anything at all, can only prove such of the particulars as it itself assumes as known. With him, a general principle to be of absolute necessity must be a principle that embraces all the particulars whether individually or by character; but then its value as proof is nullified by the fact that it is itself based on what is sought to be proved by it. If the general principle is however one that rests upon the actual observation of a certain number of particulars only, its probative force is limited by the number of observations actually made. It is this fact that he expresses by the statement that all reasoning is from particulars to particulars. By this he does not in the least imply that the *resemblance* or *identity* in the particulars plays no part in the reasoning process. He does not certainly mean by that expression that all reasoning is directly based upon those attributes in which the particulars examined differ from one another. This is certainly not the basis of his theory of reasoning. On the contrary he is well aware that it is only through the fact of resemblance that any reasoning is possible. Even when men argue from certain particulars to another particular owing to the urgency of practical action, they do not argue unintelligently but from a knowledge of *identity* or *resemblance*, though from want of scientific training they are unable definitely to formulate that resemblance. *But he insists upon our keeping constantly*

*before our mind the fact that the universal element in the particulars has no more validity for proof than what the particulars themselves can invest them with.* When the village matron pronounces upon the evil and remedy of her neighbour's child from the case of her own Lucy, she does not do so from her knowledge of any universal connection between the symptoms and the disease and its remedy, but only from her knowledge of that single connection in her own Lucy's case. Observing the symptoms to be similar to those which she noticed in the case of Lucy, she infers the disease and also the remedies which proved effectual in Lucy's case. That the intuition of the universal connection is not the ground of her inference is amply borne out by the considerable diffidence with which she makes the pronouncement. She does not tell her neighbour that the disease *must be* so and so, and that such and such treatment *must do* good. She only tells her that the same symptoms were observed in her Lucy's case and that the same treatment *may in all probability do* the child good. If her suggestion in this case should turn out successful, she becomes emboldened to make the same suggestion in another case of the same kind, and so on. If the confidence with which she draws the inference from a single connection is alleged to be greater than that single connection would warrant, it is because her experience of similar uniform connections in her past life and perhaps also an ingrained disposition (inherited) to expect uniformity have given plausibility to the connection. In any case, it is certainly not the absolute confidence that is generally alleged to be warranted by inspired knowledge, but much inferior to it.

The general principle which is the major premise must therefore be regarded according to Mill, as a summary of particular facts and a memorandum or a register of evidence *according to which* we may argue to other particular cases. Though the real evidence resides in the fact of resemblance, yet because this fact of resemblance is got at by the observation of some particulars only and has only as much force



for purposes of proof as the observation of those particulars can give it, as well as because reasoning can be legitimately so called even when clear recognition of resemblance is wanting, our reasoning is said to be in the main from particulars to particulars. Even when experimental analysis gives us a connection without the apparent necessity of particular observations, the modes of such analysis being ultimately derivations from a principle suggested by particular observations, our reasoning may be said to be *in the main*, from particulars to particulars. But in actual practice it very frequently happens that such a connection is suggested by particular observations and its deductive verification is sought after before any experimental analysis is resorted to. Even when the law is established by experimental analysis, it has still to be viewed as gaining strength by every deductive application. The memorandum, then, points to the possibility of proving other particular cases *in accordance with* it. The process is essentially as follows :—A died, B died, C died, and many others died. K resembles A, B, C, and those others in certain other attributes. Therefore, K also will die. From the particular instances observed we infer mortality of K, because K resembles the particulars observed in the possession of certain other attributes. That is to say, for inferring mortality of K we have the warrant that so many people whom K resembles in certain assignable marks died in the past. If we can infer mortality of K on this warrant, why can't we infer it of P, Q, and every other being possessing the same attributes? Yes. We can. What entitles us to infer an attribute of a single individual also entitles us to infer the same of other individuals of the same type. Thus the particular inference and the general formula rest upon the same evidence; in other words, Induction and Deduction are essentially the same process. Only, in Induction, we stop to take a survey of what we have achieved as the result of our observations, and record this result in a general formula. In Deduction, we interpret this formula for proving a new

case, instead of referring to the original observations themselves which, by virtue of their resemblance, constitute the evidence. As it has been said, it is really the comparison of one particular with other known particulars through the medium of a generality. It is the formal completing of an operation which is *essentially material*. It must also be pointed out that every successful interpretation of the formula adds to our conviction of the formula itself. The fact that the formula itself may be overthrown when in any of its interpretations the actual fact contradicts it, renders futile the possibility of its serving as the sure basis of proof. Thus, it will be seen that the *petitio principii* which appears when the major premise of the syllogism is construed as a statement materially or formally exhaustive and adequate in all its parts to the proof of particular cases, vanishes when we regard it as a statement which, while comprising two parts, the one known and the other unknown, has its proving efficacy limited to the former, and merely points to the possibility of proving the latter by the former by interpretation as cases arise.

If all inference is from particulars to particulars, then it may be asked, what is the good of a formal generality? Mill says, "it is a collateral security for the correctness of the generalisation itself." When from a number of particular observations a person draws an inference to another particular, if his attention is directed to the fact that his inference to that particular must equally apply to other particulars of the same kind (we are here considering inference in its main features), he may become alive to the extent of the consequences involved, and he may hence reflect once more upon the evidence on which he drew that particular inference. The same advantage is expressed in another form. The general formula is best fitted to suggest contradictory instances if such exist. If Commodus had been expected to be a just ruler by a subject of the Roman Empire because others before him had been just, then the proposition, 'All Roman

Emperors are just,\* would have suggested the instances of Nero, Domitian, &c. There are other advantages also, such as the facility afforded for separately examining the conditions of validity, and the possibility of subsequent generations making use of it involving further opportunities of its being confirmed or overthrown.

The above exposition of Mill's view has been made with special reference to the objections that have been recently advanced against it. If it is objected that the major premise is a statement of resemblance which is obtained only from a small number of instances, that it expresses a necessary connection of attributes though thus obtained, and that it can therefore be adduced in proof of other particulars without committing the fallacy of *petitio principii*, Mill's answer would be, that the necessity of the connection referred to is not absolute, and to show that it is contingent upon the extent of our experience of it and that it is better to regard the particular experiences themselves as constituting proof instead of the universal element in them. However strong may be our conviction of a general truth obtained by the canons of induction it must be accepted as holding good only so long as the conditions of this world last. In fact, every new instance found to come under the general law, strengthens the necessity of the connection. Even when the principle is regarded as of absolute necessity, Mill would ask, is there not involved a *petitio principii* FORMALLY, (i.e., by marks), but not materially, when you advance the major premise comprising the known and the unknown *in proof* of one of the unknown? No doubt when you made the general assertion you never knew anything about that particular individual, but did you not point to that individual by character? Yes, says Whately, but you asserted it by implication merely. Mill says that this can only mean that you asserted it unconsciously, and by *unconscious assertion* (a phrase which he used by way of expounding what Whately intended to say) he meant only the assumption of the particular truth without

knowing its specific nature. It is an assertion from Mill's point of view, and Mill says that the asserter is not conscious of it. It is in this connection that Mill is charged with using unpsychological language. Such an assumption of the particular truth without knowing its specific nature may be conceded by his opponents, but it may be asked, does that constitute a *petitio principii*? If it does, then it may be urged that in every proof there will be a *petitio principii*. We can know nothing which was not previously existent objectively. Whatever evidence gives us a conclusion, must have contained that conclusion previously in it. Only we become conscious of it now. But Logic cannot be expected to do more than this. It can only enable us to know what was previously existent in some form. Yes. This is all true; but the question is, which mode of knowing a thing is to be properly designated *Inference*? Which mode of viewing the syllogism adds dignity to the process and frees it from even the tinge of a *petitio principii*, even the shadow of it? In replying to this objection from the standpoint of Mill, it may perhaps conduce to clearness to draw the attention of the reader to the distinction between two processes of separation or derivation of things from an antecedent substance. In the one case, the quantity of the antecedent from which all the things are derived is exactly the same as, or even more than, the total quantity of the things themselves, as in the case of the evolution of the various and manifold things, of the world from the Infinite, the original substance supposed by Anaximander; and in the other case, the quantity of the antecedent is much less than the total quantity of the things, while the things themselves develop out of that limited quantity of the antecedent owing to its inherent capacity for expansion under the action of other forces, as in the case of the development of the tree from the seed, or of the evolution of the many things from an original substance also homogeneous in quality, but limited in quantity. Mill would prefer the latter process to the former. His



inferring new cases from cases observed through their resemblance which, to all intents and purposes, is enough to justify the inference, may be likened to the latter process and may be called *material inference*, i.e., an inference which is real, not in any manner presupposed in the premises. If you want to provide for the contingency of the major premise being overthrown by the appearance of a contradictory instance, you cannot make the whole of it possess evidentiary value. Our past experience of uniform connections has now enabled us to go far into the future, but we can never say we have attained the absolute. We must be prepared for a reversal of even the strongest of our convictions. It is this element of uncertainty that always attaches in his opinion to the general principle that is obtained from experience, and his conviction that no other source of a higher certainty is possible, that made him abandon the grounds on which he originally defended, the syllogistic theory as the common-sense analysis of the enthymematic argument (*Westminster Review*, 1828), and, taking a material view of Logic, maintain that reasoning is in the main inductive, and that deduction is only a stage in the process, being merely the interpretation of a memorandum.

(1) The major is a sum- } The syllogism involves  
mation of particulars. } a *petitio principii*.

(2) The major is a universal proposition expressing a universal connection of attributes, though obtained only from a number of particulars. It is formally or (by character) exhaustive.

(a) There is a *petitio principii* (unconsciously committed) when the whole premise is ad-  
duced in proof of the conclusion. The  
*petitio principii* vanishes when evidentiary  
value is held to attach only to the observed

part of the major premise and when the process is conceived as a process of interpretation... J.S. Mill.

- (b) There is no *petitio principii*. All knowledge is only knowledge of what was previously existent in some form and logical rules can only enable us to perceive directly in consciousness what was implicated in the premises. The necessity of a minor premise also shows that the conclusion is not an inference from the major premise alone.

Minto says that, having conceived Syllogistic Logic as the interpretation of a memorandum, Mill ought not to have regarded it as a stage in the process of Induction, because "if Deduction is the interpretation of a memorandum, it is no part of the inference from facts. The conditions of correct interpretation as laid down in syllogism are one thing, and the methods of correct inference from facts, the methods of science that he was in search of, are another." Why should any doubt be entertained regarding the accuracy of the memorandum itself, seeing that the memorandum is established by the canons of Induction? Mill's account of the syllogistic process has a meaning only when the major premise is regarded as a suggestion from simple enumeration requiring to be verified deductively. It may be said in reply that, even when the principle is established by the canons of

induction, the canons being only different aspects of a law which is obtained again from experience (though of a peculiarly certain kind), the principle must be regarded as *essentially* of the same kind as that obtained directly from particular experience. Mill's inductive proof merely consists in bringing the generalisation to be proved under the widest generalisation known to experience. But we may here ask, if there is still some doubt about the memorandum, with what justice can we call Deduction the interpretation of a memorandum, unless it be for the purposes of verification? And how can verification be regarded as complete, unless the interpretation as a distinct process is based upon correct principles? Again, it may be true that the widest experience is still *experience*, and if the present arrangements of the universe are reversed, the results of even such experience will not hold. It may be true that we cannot be sure of even the strongest of our convictions. But is it not also true that for all practical purposes we regard this certainty of experience as sufficient, and taking for granted the truth of certain premises we desire to know the implications contained therein? Do we in practice always seek to establish general truths only? Is it not true that there are fewer occasions for this, and more frequently the necessities of practical life require that we should know what truths are involved in the premises which we have accepted as true? If so, Mill should have taken notice of this formal aspect of Deduction instead of fixing the eyes solely

on the material aspect of it. He should not have raised the question of the ground of material inference when the point of discussion is solely in regard to the use and validity of the formal process of interpretation. Minto says,—“ Mill ought rather, in consistency as well as in the interests of clear system, to have drawn a line of separation between the two as having really different ends, the conditions of correct conclusion from accepted generalities on the one hand, and the conditions of correct inference from facts on the other. Whether the first should be called inference at all is a question of naming that ought to have been considered by itself. We may refuse to call it inference but we only confuse ourselves and others if we do not acknowledge that in so doing we are breaking with traditional usage. Perhaps the best way in the interests of clearness is to compromise with tradition by calling the one Formal Inference and the other Material Inference.”

---

## CHAPTER VIII.

### *DEDUCTIVE SCIENCES AND DEMONSTRATIVE EVIDENCE.*

The Deductive Sciences are those that start with certain well-established inductions, and carry them out into their various applications by bringing cases under them. In Mathematics, which is a deductive science, we start with a few inductions (the axioms, or the first principles of the science), and find out



minors with a view to know what particular truths are implied in them. In the Inductive Sciences, as Chemistry and Physiology, our main object is to establish inductions.

In those departments of nature where the phenomena are inaccessible to observation and experiment, the only course open is to make the best use of the available fundamental truths in the way of getting out of them as many derivative truths as possible. These truths cannot be established directly by observation or experiment; and so, resort is had to the indirect method of obtaining them from those that have been so established. The deductions that are made facilitate ready use and application, and dispense with the labour of actual deduction. From the axioms of Geometry innumerable properties are obtained, or evolved quite in the same way in which a spider's web is woven out of its organism. Any of these properties remotely connected with some first principle as the last link in a chain of successive deductions, can be utilized in any emergency without the labour of actual deduction from that principle. When a height has to be ascertained, we deduce it from a theorem which happens to be applicable to it.

Dr. Bain ascribes the length and the complicity of mathematical or other reasonings to two circumstances. In the first place, the reasonings often consist of many steps of immediate inference, as in applying definitions and taking the obverse and the converse forms of propositions when such forms are needed for drawing the final conclusions. Secondly, much preparatory construction is needed for facilitating the required deduction, and when the construction is made, the inferences that issue from

the several parts of the construction have to be made convergent to the main purpose in hand. Similarly, if the hypothesis itself is complicated, the inferences that can be drawn from the several members of the hypothesis have to be made convergent to the main proof. Dr. Bain also points out that the material process of identification for the purpose of establishing a minor is difficult according to the complicity of the properties on which the identification has to be effected. To diagnose a disease is no easy matter.

What is known as "Demonstrative proof" is, in the last resort, inductive proof; for it is synonymous with deductive proof, and a deduction always presupposes an induction. The truth of any particular deduction depends upon the validity of the induction itself which is presupposed. In deduction, we are simply bringing particular cases under the sweep of general principles which are accepted as major premises.

Now, to show that Mathematical Demonstration is inductive, we must show, firstly, that the First Principles of Mathematics are inductive in origin, and, secondly, that the axiom of the syllogism, which justifies the application of these principles, is also inductive in origin. It is held by one school of philosophers, however, that these principles are intuitive in origin and are not inductions from experience; for, if they were not intuitive and were merely generalizations from experience, they would not possess the *necessity* which they are seen to possess. This may be doubted, and the question may be raised as to the various meanings of 'necessity' with a view to examine whether the characteristic of 'necessity' is necessarily such as to claim an intuitive origin for the ideas possessing it.

Firstly, the term 'necessity' is frequently used in the sense of 'certainty.' When we say that a certain thing will necessarily happen we mean that it will certainly happen. In common speech the term is applied in this sense to all inductive truths, or truths obtained from experience; so that it is clear that it is not thought that there is anything peculiar in the meaning of 'necessity' which renders it inapplicable to truths gained from experience. The law of gravity, the law of causation, the laws of motion, are all necessary laws in this sense. It is a mistake to suppose that the strong assurance which the word signifies cannot be given by experience.

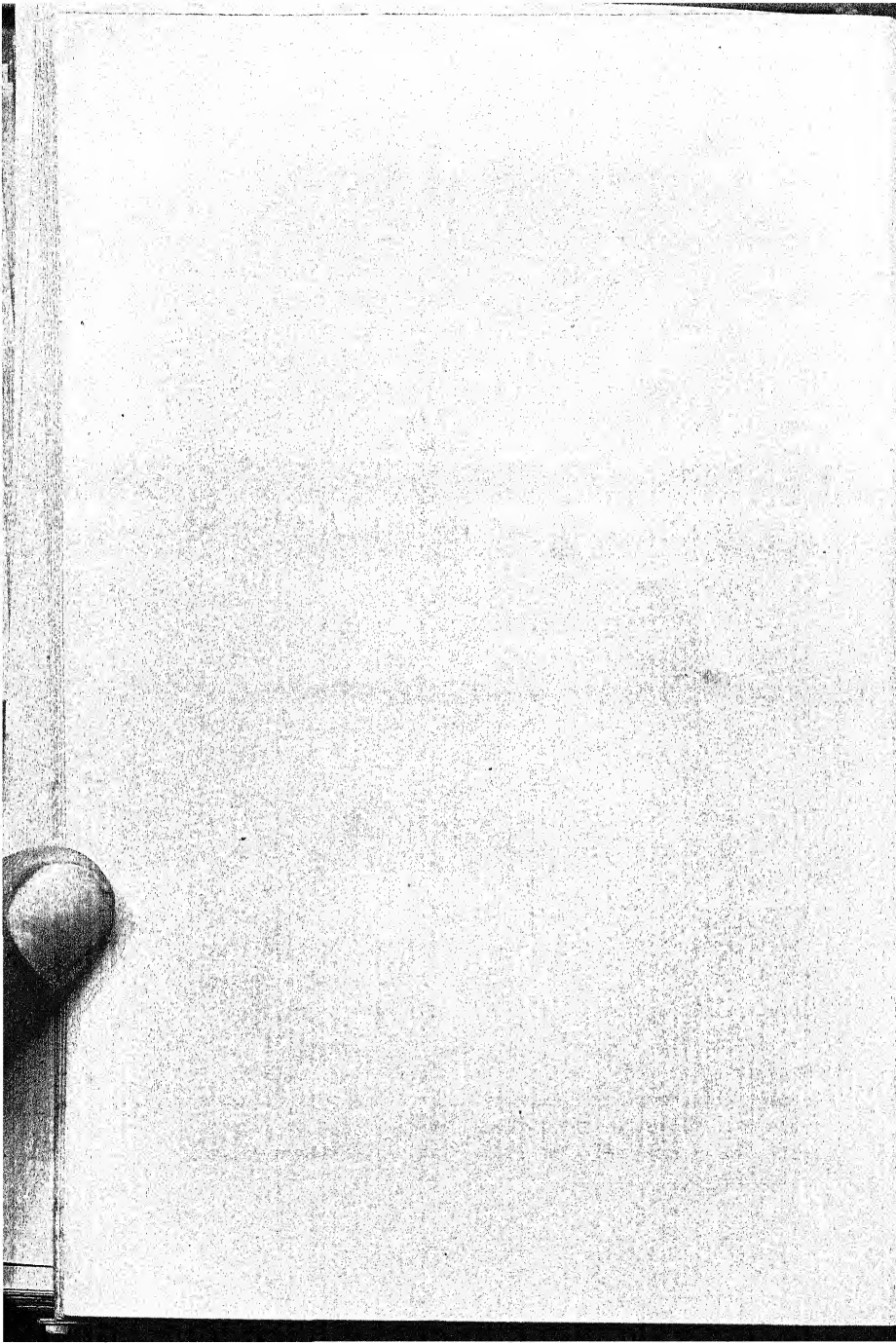
Secondly, the term 'necessary' is applied to truths of *implication*. 'A whole is greater than its part' is a necessary truth in this sense. As soon as we know the meanings of 'whole' and 'part,' we understand the truth. Knowing the meanings of 'whole' and 'part,' we cannot deny the truth without contradicting ourselves. Other truths of the same kind are:—'Two straight lines cannot enclose a space;' 'the same thing cannot be in the same place at the same time,' &c. These truths are no doubt independent of experience, but they do not also require any innate powers to perceive them. Our ordinary intellectual powers are quite competent to enable us to perceive their truth.

Thirdly, a truth is considered to be *necessary* when the opposite of it is inconceivable. But the opposite of a proposition becomes inconceivable owing to repeated experience of that particular relation between subject and predicate in past life; so that, the inconceivability of the opposite, as a test of proof, represents the net result of all the past experience and education of the individual. On the hypothesis of evolution and heredity, it

represents not merely the experience and education of the individual, but also all that the previous generations have been able to gather from their experience and education. If a truth was a truth for all past generations, then, it must have been handed down from generation to generation in more and more accentuated forms, until, in the thought of the present individual who is the last link in the chain, it has become totally irreversible. Necessity, in this sense also, does not thus include any element which cannot be traced to experience, and which presupposes the necessity of innate powers.

---





# BOOK V.

## FALLACIES.

---

### CHAPTER I.

#### LOGICAL FALLACIES.

1. General Remarks.—Fallacies (*L. fallere*, to deceive) are either the deliberate contrivances of the Sophist by which he attempts to *deceive* his hearers, or the unperceived pitfalls into which a thoughtless or unsound reasoner precipitates (and thus deceives) himself.\* They are “apparent arguments which profess to be decisive of the matter at issue, while in reality they are not.” They are unsound reasonings which either involve violations of the rules of Logic, or contain unduly assumed premises or irrelevant conclusion. Against such errors of reasoning, thorough acquaintance with the logical principles and with the usual modes in which men err, and the cultivation of the habits of correct thinking and reasoning, are the only safeguards. These and these alone can enable one to detect a fallacy committed by one’s opponent ; for it

---

\* Some logicians apply the name *Sophisms* to cases of the first description, and *Paralogisms* to those of the second. DeMorgan, however, observes that he fails to see the grounds of such a distinction. He would use the word ‘Paralogism’ to specify an offence against the formal rules of inference. This is also Aristotle’s use of the term.

is both important and difficult to detect a fallacy. The importance of detecting a fallacy is best illustrated by the instance which Whately cites, of a divine who, in addressing a multitude, studiously avoided all use of the figures of rhetoric, simply because "for the lower orders one's language cannot be too *plain*." He failed to see that '*plain*' in the maxim means 'so clear as not to require any learning to understand it,' and, consequently, instead of not implying a studious avoidance of the use of the figures, such as metaphor, simile, antithesis, &c., it necessitates their employment for the sake of clearness and perspicuity. His speech became dry, and he failed to realize its intended effects. Again, in long harangues and in elliptical language, fallacies lie concealed, which it is impossible to detect unless one has a thorough familiarity with the nature of each fallacy and the modes in which the Sophist employs it. Hence it is considered necessary to treat of the fallacies separately, and thus, as far as possible, to enable the student to be on his look out either in receiving inferences, or in making them himself.

2. Classification of fallacies.—Fallacies are divided into the Logical and the Material Fallacies. Logical fallacies are violations of the rules of the processes usually considered in Logic and derive their name from this circumstance. They may be sub-divided into those relating to *Deductive* Logic and those relating to *Inductive* Logic. Each of these may again be sub-divided into the *Non-inferential* and the *Inferential* fallacies. The former are those that do not relate to Inference, but that arise from a deviation of the rules of some intellectual processes.

auxiliary to Inference or otherwise relating to it. Such are the fallacies of Definition, Division, Hypothesis, &c. Under *Non-inferential* fallacies relating to Deduction are also included the fallacies known as "*Semi-logical fallacies*" arising from ambiguous language. The Inferential fallacies are those that lie in the actual process of transition from the datum or data to the conclusion. The *Inferential* fallacies relating to Deduction may again be subdivided into the fallacies of *Immediate* inference and those of *Mediate* inference. Of the first class are those arising from a transgression of the rules of "The Opposition of Propositions," "Obversion" and "Conversion," &c. The fallacies of *Mediate* inference are those that arise from a transgression of the Syllogistic rules. *Material* fallacies are those that arise either from the premises being unduly assumed, or from the argument being not to the point.

### 3. Detailed enumeration under each class.—

We need consider here only the fallacies relating to Deductive Logic.

#### (A) *Non-Inferential fallacies.*

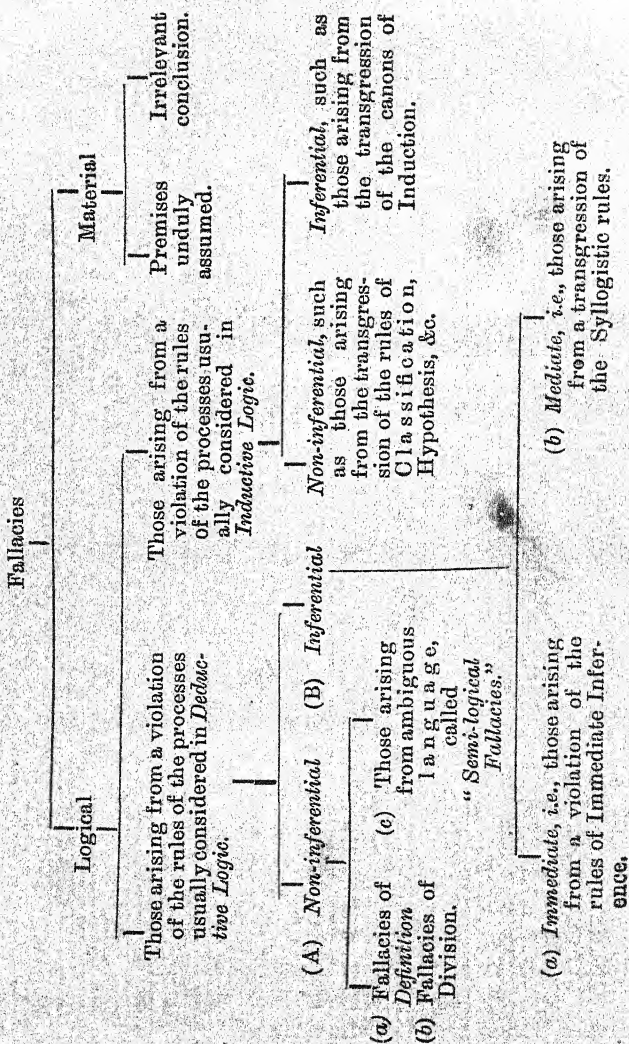
(a) *Fallacies of Definition.*—These arise from a breach of the rules of Definition.

- (1) Definition by *accidental* marks, or by *propria*.
- (2) Too wide or too narrow definition.
- (3) Circulus in Definiendo.
- (4) Obscure, figurative, and ambiguous definition.
- (5) Negative definition.

#### (b) *Fallacies of Division*—

- (1) Cross Division.
- (2) Overlapping Division.
- (3) Incomplete or Overcomplete Division.
- (4) Divisio non-faciat Saltum.





(c) *Semi-logical fallacies*.—Under this head, Whately brings all the fallacies which arise from ambiguous language and which he regards as merely cases of ambiguous middle.

(1) *Fallacia Figuræ dictionis*. (Fallacy of figure of speech).

(2) *Fallacia Equivocationis*. (Fallacy of Equivocation).

(3) *Fallacia Amphiboliæ*. (Fallacy of Ambiguity).

(4) *Fallacia Compositionis et Divisionis*. (Fallacy of Composition and Division).

(5) *Fallacia a dicto simpliciter ad dictum secundum quid*. (Fallacy of Accident).

(6) *Fallacia a dicto secundum quid ad dictum simpliciter*. (Converse fallacy of Accident).

(7) *Fallacia Prosodiæ or Accentus*. (Fallacy of Accent).

(8) *Fallacia Plurium Interrogationem*. (Fallacy of many questions). Each of these fallacies requires special explanation and illustration.

(B) *Inferential Fallacies*.

(a) *Fallacies of "Immediate Inference."*

(1) *Fallacies of "The Opposition of Propositions"* arising most frequently from a confusion of the *contrary* and the *contradictory* of a proposition, and from not noting particularly the circumstances, such as:—

If A and E be both false, I and O will be true.

If I be true, A may be true or false.

If O be true, E may be true also.

If O be true, I may be true also, and so on.

(2) *Fallacies of "Obversion"* arising in the same manner from a breach of the rules.

(3) *Fallacies of "Conversion,"* the most frequently occurring of which being the *wrong* conversion of the Universal Affirmative, which is called also the "Fallacy of Accidens." Under this head may also be mentioned the wrong conversion of a hypothetical proposition, which is also called the "fallacy of the consequent."

(4) *Fallacies of Contraposition.*

(5) *Fallacies of Inversion.*

(6) *Fallacies relating to Added Determinants.*

(7) *Fallacies relating to Complex Conception.*

(8) *Fallacies relating to Converse Relation.*

(b) *Fallacies of Mediate Inference.*

(1) Fallacy of four terms (Quaternio Terminorum);

(2) Fallacy of Undistributed Middle;

(3) Fallacy of Illicit Major;

(4) That of Illicit Minor;

(5) That of Negative Premises;

(6) That of drawing an affirmative conclusion when one of the premises is negative;

(7) That of Particular Premises;

(8) That of drawing a universal conclusion when one of the premises is particular.

The last two fallacies may easily be resolved into the foregoing.

4. Detailed description of the "Semi-logical fallacies."—*Fallacia Figuræ Dictionis.*—This fallacy consists in using two words which are derived from the same root, but which are of different grammatical types, as if they bear the same sense in the premises. If from 'All creditors will be deceived' and 'This man is a man of credit,' one should argue that this man will be deceived, one would be committing this fallacy; for, the word *creditor* and the

phrase *man of credit* do not mean the same thing. The former now means 'one to whom money is due,' and the latter, 'one that has gained the confidence of others.' The paronymous words *project* and *projector* which Whately suggests are of the same nature. "Projectors are unfit to be trusted; this man has formed a project, therefore, he is unfit to be trusted," is evidently a fallacious argument, since a project may be a practicable one, though a projector is always a man who forms wild schemes. Aristotle's instance of this fallacy is amusing. "Whatever a man walks he tramples on, a man walks the whole day, therefore, he tramples on the day."

*Fallacia Equivocationis* is a very common fallacy in which one term is used in two different senses in the premises. The term so employed is thus usually the middle term. I speak truly in calling you a man, and since, in calling you a dunce, I call you a man, I speak truly in calling you a dunce. Here *man* in the minor premise is used in a restricted sense, i.e., *man as a dunce*. Again, evil should, on no account, be allowed, and since punishment is an evil, punishment should, on no account, be allowed. Here 'evil' is used in two different senses, 'moral evil' and 'physical evil.' But the person that uses this argument may choose to say that he uses the word in the same sense in the premises; and then there will be no fallacy. But the truth of one of his premises will then be open to question. Another example is, all criminal actions should be legally punished, prosecutions for theft are criminal actions, and therefore these should be punished by law. Here equivocation is implied in both the words 'criminal' and 'action.' The phrase 'criminal action' in the major premise means 'actions or doings prohibited by criminal law.' The same phrase in the minor premise means 'measures relating to the Criminal Procedure Code.'



Under this head fall all those cases in which the Sophist, with a view to deceive his hearers, employs a word or an expression so as to make them understand it in its ordinary sense, but, when so understood, proceeds to act as if what he meant by it was its literal or other sense. Hyder's promise to Nunjeraj and his consorts that he would treat Kunde Row like a paraquet though he had proved treacherous to him, (by which they understood, naturally enough, that he would bestow on his behalf as much care, attention and affection, as are usually shown towards that bird), and his subsequent fulfilment of his promise by enclosing the unlucky brahmin in an iron cage and allowing him a daily portion of rice and milk, furnish an instance of the fallacy of Equivocation.

DeMorgan mentions, as falling under this head, the case of "the settlement of the merit of a person, or an opinion, not by arguing the place of that person or opinion in its species, but by arbitrary alteration of the boundary of the species, with the intent of excluding the individual in question altogether." In connection with the question whether Pope was a poet or not, some of the disputants impertinently undertook to define the word *Poet*, and defined it at last so as to exclude Pope from the category. He also mentions the case in which a person assumes a certain meaning of a phrase, which is derivable from a combination of the meanings of the various words composing it without giving notice of the same to the opposite party. Such an assumption is wrong, since the meaning of a phrase is not always determined by the meanings of the words entering into it. If a person, undertaking to *cross a bridge* in a very short time, were to do so by running over the breadth of the bridge, he would be commit-

ting this fallacy ; for *to cross a bridge* means to cross *the river over bridge*.

*Fallacia Amphibolix* consists in the ambiguous employment of a sentence which admits of double construction. 'These words were left unmarked as mistakes,' may mean either that the wrong words were *omitted* to be marked as such, or that they were not marked, the right words being those that ought to be marked. This fallacy of Amphibology is said to have been a sort of refuge to the ancient oracles that professed to divine future events, and especially in cases where the possible alternatives are only two. The reply "Pyrrhus, the Romans shall, I say, subdue" is no reply and ought not to have satisfied any one. Similarly, the prophecy in Shakespeare, "The Duke yet lives that Henry shall depose" may mean either that Henry shall depose the Duke, or that the Duke shall depose Henry. Such an ambiguous construction may occur in a syllogism, and create much confusion. Thus,

Twice three and four (10) marbles cost 5 As.

All the marbles that I have are twice three and four (14).

∴ All the marbles that I have cost 5 As.

Our conclusion is wrong. They should cost 7 As. according to our supposition. 'I intend going to Madras and accomplishing my business next Tuesday' is likewise of ambiguous construction.

*Fallacia Compositionis et Divisionis*, or the fallacies of Composition and Division consist in employing the middle term distributively or distinctly in one premise and collectively in the other ; or, in employing the same term distributively in the premises and collectively in the conclusion, or *vice versa*. If the middle term is used

collectively in the major premise and distributively in the minor, then it is called the fallacy of Division ; *e.g.*,

The trees of our garden form a thick shade.

This is a tree of our garden.

∴ This forms a thick shade.

Again, if the middle term is used distributively in the major and collectively in the minor, or if the same term is employed distributively in the premises and collectively in the conclusion, then it is called the fallacy of Composition ; *e.g.*,

All the trees of our orchard are spiral in shape.

Our property is made up of those trees.

Hence, our property is spiral in shape.

is an argument with a fallacious conclusion resulting from the use of "all the trees" distributively in the major and collectively in the minor. "All the trees" in the major means "each tree taken distinctly." Again, three and two are two numbers, five is three and two, and hence five is two numbers. Other instances of a similar nature are given by Whately.

"This is a fallacy with which men are extremely apt to deceive *themselves* ; for when a multitude of particulars are presented to the mind, many are too weak or too indolent to take a comprehensive view of them ; but confine their attention to each single point, by turns ; and then, decide, infer, and act, accordingly ; *e.g.*, the imprudent spendthrift finding that he is able to afford this, or that, or the other expense, forgets that *all of them together* will ruin him."

He also speaks of another fallacy by which people may be made to conceive a compatibility between two incompatible objects by means of a rapid and constant reference to

each of them alternately. "You may prove that £100 would accomplish this object; and then, that it would accomplish *that*: and then, you recur to the former; and back again: till at length a notion is generated of the possibility of accomplishing both by this £100."

"Two distinct objects may, by being dexterously presented, again and again in quick succession, to the mind of a cursory reader, be so associated together in *his thoughts* as to be conceived capable, when in fact they are not, of being *actually* combined in practice. The fallacious belief thus induced bears a striking resemblance to the optical illusion effected by that ingenious and philosophical toy called the Thaumatrope, in which two objects painted on opposite sides of a card,—for instance, a man and a horse,—a bird and a cage,—are, by a quick rotatory motion, made to impress the eye in combination, so as to form one picture, of the man on the horse's back, the bird in the cage, &c. As soon as the card is allowed to remain at rest, the figures, of course, appear as they really are, separate and on opposite sides. A mental illusion, closely analogous to this, is produced, when, by a rapid and repeated transition from one subject to another alternately, the mind is deluded into an idea of the actual combination of things that are really incompatible."

Again, in deducing the amount [of probability of the conclusion from two only *probable* premises, people often commit the mistake of exaggerating it. For, the argument,—Our agents in Calcutta may not start on dark nights; To-night may be a dark night; Hence our agents may not start to-night;—let the probability of the major premise be represented by the fraction  $\frac{1}{8}$ , i.e., let them be supposed not to care for dark nights at all in seven cases out of eight, and let the probability of



the minor premise be represented by  $\frac{3}{5}$  in the same way, then the probability of the conclusion will be represented by the fraction  $\frac{1}{8} \times \frac{3}{5}$  or  $\frac{3}{40}$ , i.e., the probability of their not starting to-night will be very slight, and will be less than that of the less probable of the premises. To overrate the probability of the conclusion would be a fallacy which we shall call "The Fallacy in the composition of probabilities." Other logicians have not recognised such calculations on the ground that the *exact degree* of probability of each premise cannot be ascertained; but, Whately remarks in reply that "this unavoidable uncertainty is no reason why we should not guard against an additional source of uncertainty which *can* be avoided." "It is some advantage," he says, "to have no more doubt as to the degree of probability of the conclusion than we have respecting that of the premises."

*A dicto simpliciter ad dictum secundum quid* (From statement simple to statement according to something) is a descriptive name for "Fallacia Accidentis" or "the Fallacy of Accident." This fallacy is committed when an erroneous application of a general rule to a particular instance is made, an application not warranted by some accidental circumstance. When the major premise is an assertion in which the middle term is considered *simply* or *as to its essence*, the minor is one in which it is considered under certain conditions and circumstances. "What is bought in the market is eaten. Raw meat is bought in the market, therefore, raw meat is eaten," is an erroneous argument in which *meat* is taken *simply* or *as to its essence* in the major, and with the attribute of rawness added to it in the minor premise. If, from "All bodies gravitate," one should infer that a balloon should also gravitate, since it is also a body, one would be committing

the fallacy before us; for balloon is a specific kind of body, hollow and filled with hydrogen gas. The same fallacy will be committed when, from “Every man should be held responsible for his actions,” it is argued that a lunatic also should be held answerable for his deeds since he is also a man; for a lunatic is a man with his brain deranged.

To illustrate that jests, puns, &c., are only glaring fallacies exciting laughter, because they break one or another of the simplest rules of Logic, DeMorgan relates Boccacio's interesting story of the storks, the jest of which consists in predicating of *roasted* storks what can be predicated only of storks in general. The following is the story as given in DeMorgan's book:—A servant who was roasting a stork for his master was prevailed upon by his sweet-heart to cut off a leg for her to eat. When the bird came upon the table, the master desired to know what was become of the other leg. The man answered that storks had never more than one leg. The master, very angry, but determined to strike his servant dumb before he punished him, took him next day into the fields where they saw storks, standing each on one leg, as storks do. The servant turned triumphantly to his master: on which the latter shouted, and the birds put down their other legs and flew away. “Ah, Sir,” said the servant, “you did not shout to the stork at dinner yesterday. If you had done so, he would have shown his other leg too.”

DeMorgan brings under this head the fallacy of designating a thing by the same name even after its form and substance have been changed a number of times. The person who claimed to have preserved a knife for twenty years, giving it sometimes a new handle and sometimes a new blade, was committing this fallacy. “The

American calculating boy, Zera Colburn, was asked how many black beans it would take to make ten white ones; to which he very properly answered 'Ten, if you skin em': but the ten skinned beans would not be the *same beans* as before: except, indeed to those to whom black is white."

*A dicto secundum quid ad dictum simpliciter* (From statement according to something to statement simple) is a descriptive name for "the Converse Fallacy of Accident." This fallacy consists in employing the middle term *with its accidents* or under certain conditions in the major premise, and *simply* or *under no conditions or circumstances whatever* in the minor premise. It is arguing from a special case to a general one. From "adulterated milk is not a substantial food," we cannot conclude that "No milk is a substantial food." From "Students that always depend upon others for help should never be assisted," we cannot argue that no student should be assisted. The restricting circumstance present in the first is absent from the second. It is remarked that many instances of this fallacy are wrong conversions of the Universal Affirmative; for, when, from "All men are mortal" we say "All mortals are men," we are ignoring those qualifying and characteristic circumstances that justify the appellation *men*. "All men are mortal" is equivalent to "All those living beings that possess corporeity, animality, a particular visible form, &c., are mortals"; and we know, as a matter of fact, that the classes of living beings in general and mortals are co-extensive. So then, if we infer that "All mortals are men" from the first, in order that this inference may be correct, we should be taken as ignoring the specific attributes of *men*.

DeMorgan says :—" An advocate is sometimes guilty of the argument *a dicto secundum quid ad dictum simpliciter* ; it is his business to do for his client all that his client might *honestly* do for himself. Is not the word in italics frequently omitted ? *Might* any man honestly try to do for himself all that counsel frequently tries to do for him ? We are often reminded of the two men who stole the leg of mutton ; one could swear he had not got it, the other that he had not taken it. The counsel is doing his duty by his client ; the client has left the matter to his counsel. Between the unexecuted intention of the client and the unintended execution of the counsel, there may be a wrong done, and if we are to believe the usual maxims, no wrong-doer."

*Fallacia Prosodice or Accentus*, or ' the Fallacy of Accent ' arises from shifting the emphasis from the word to which it properly belongs and placing it on some other word in a sentence, thus wholly changing its meaning. If, in ' you should not have *walked* to Madras yesterday,' the emphasis which properly belongs to *walked* is transferred to *Madras*, then, the meaning becomes different. In fact, the sentence admits of four meanings in this way. It may be either that another man should have walked, or that the person spoken of should have gone in a carriage, or that he should have gone to some other place than Madras, or that he should have gone on some other day. Employing a sentence of this kind as the middle term, we may construct a syllogism thus :—

Those that *walk* to Madras fall feverish.

And those that walk to *Madras* are always benefited by the civilizing influences of the Metropolis.

∴ Some that derive this benefit fall feverish.



This is not a necessary conclusion from what we have supposed, though in itself it may be a true one. Again, 'John is not active, honest and intelligent,' is capable of several meanings.

"A statement of what was said, with the suppression of such tone as was meant to accompany it, is the *fallacia accentus*. Gesture and manner often make the difference between irony or sarcasm, and ordinary assertion. A person who quotes another, omitting anything which serves to show the *animus* of the meaning; or one who, without notice, puts any word of the author he cites in italics, so as to alter its emphasis; or one who attempts to heighten his own assertions, so as to make them imply more than he would openly say, by italics, or notes of exclamation, or otherwise, is guilty of the *fallacia accentus*."

Besides the fallacy by which the statement of the opposite party is misrepresented by an alteration of the emphasis, that by which a misstated proposition is taken advantage of even when the party knows what the proponent means to convey by his proposition, is also referable to this head. DeMorgan mentions the case of a speculator who, satisfied that he could contend in mechanics though he was avowedly ignorant of geometry, is said to have written to a scientific society challenging them to an anti-Newtonian controversy. It appears that they, in reply, recommended him to study mathematics and dynamics. Offended much at the recommendation which he thought was an impertinent one, he rejoined rather angrily and exclaimed '*I did not confess my ignorance of dynamics.*' It is clear that in this he did not mean to emphasise 'confess,' but he meant to lay stress on 'dynamics.' His idea would have been completely and correctly expressed by "It was not dynamics of which I confessed ignorance."

If he had said so, and if a member of the society had replied to him by saying "though you did not confess your ignorance of dynamics, yet you showed it," he would have been guilty of the *fallacia accentus*. Even if he had not said so, if the member had only known what the assailant meant to convey by his reply, and if he had replied in the manner referred to, he would have been guilty of the same fallacy. Jevons tells us of Jeremy Bentham that he was so much afraid of this fallacy that he engaged a person who had a peculiarly monotonous way of reading, to read for him.

*Fallacia Plurium Interrogationem* or, 'the fallacy of many questions,' is that by which two or more questions are combined into one. The question said to have been proposed by Charles II. to the first members of the Royal Society, "Why does not a dead fish add to the weight of a vessel of water, while a live fish does?" is a question of that nature. It implies the two questions, 1st, is it a fact? 2ndly, if so, what is the cause of it? 'Have you given up your vicious course of life?' implies two questions, and the Sophist who urges it must be met by the opponent by splitting the question into two and answering each in turn. The common example of 'Have you left off beating your mother?' is in point. This fallacy is often resorted to by some barristers who, in their cross-examination of witnesses, put a complicated question implying many other questions and attempt to elicit the answer "yes or no" to it, intending thereby to make use of the answer given only for a part of the question, as for the whole. Whately illustrates the practical importance of guarding against this fallacy by an instance in which the doubleness of the question turns upon the ambiguity of a word, and points out how this fallacy may be

referred to the head of ambiguous middle. He says:—

“In all reasoning it is very common to state one of the premises in form of a question, and when that is admitted, or supposed to be admitted, then to fill up the rest: if then, one of the terms of that question be ambiguous, whichever sense the opponent replies to, the Sophist assumes the *other* sense of the term in the remaining premise. It is therefore very common to state an equivocal argument in form of a question so worded, that there shall be *little doubt* which reply will be given; but, if there be such doubt, the Sophist must have two fallacies of equivocation ready; *e.g.*, the question ‘whether anything vicious is expedient’ \* \* \* \* is of the character in question, from the ambiguity of the word ‘*expedient*’ which means sometimes, ‘conducting to temporal prosperity,’ sometimes ‘conducive to the greatest good.’ Whichever answer therefore was given, the Sophist might have a fallacy of equivocation founded on this term; *viz.*, if the answer be in the negative, his argument, logically developed, will stand thus: ‘What is vicious is not expedient; whatever conduces to the acquisition of wealth and aggrandisement is expedient; therefore it cannot be vicious:’ if in the affirmative, then thus, ‘whatever is expedient is desirable; something vicious is expedient therefore desirable.’”

## CHAPTER II.

### MATERIAL FALLACIES.

Material fallacies relate directly to the subject-matter. They were termed by the schoolmen fallacies “*extra dictionem*,” just as the Logical fallacies were termed by them fallacies “*in dictione*.” They arise either from the

premises being unduly assumed, or from the argument being not to the point. In the former case, the undueness of the assumption may be due to the fact that the premise assumed depends upon the conclusion itself, in which case the fallacy is called *petitio principii*; or, it may be due to the premise being false or unsupported, having nothing to do with the conclusion, in which case the fallacy is called "*Non causa pro causa*." The fallacy of *petitio principii* may assume one of two forms. Either one of the premises may be the same as the conclusion (*circulus in probando*, or reasoning in a circle) or it may be proveable from it. The name "*petitio principii*" is more strictly applied to the first form, while the name "begging the question" is applied to denote all forms of the fallacy. The fallacies of *Irrelevant conclusion* are also of two kinds. The reasoner may merely appeal to the passions and prejudices, or, he may shift his ground. Now, we shall discuss these fallacies in detail.

*Petitio Principii.* This fallacy consists, in its simplest form, in employing the conclusion itself as one of the premises. We say "one of the premises," because in every syllogism the conclusion is implied in both the premises taken collectively. If, in the proof of '*x* is *z*' by means of the syllogism,

$y$  is  $z$   
 $x$  is  $y$   
 $\therefore x$  is  $z$   
the truth of ' $y$  is  $z$ ' itself depends upon  
 $x$  is  $z$   
 $y$  is  $x$   
 $\therefore y$  is  $z$

then it is a case of the *petitio principii*. Whately defines this fallacy as embracing "those cases in which one of



the premises either is manifestly the same in sense with the conclusion, or is actually proved from it, or is such as the persons you are addressing are not likely to know, or to admit, except as an inference from the conclusion as, *e.g.*, if any one should infer the authenticity of a certain history, from its recording such and such facts, the reality of which rests on the evidence of that history." He says that the assumption of a premise less evident than the conclusion may be fair, provided it is proposed first to prove that premise; and it is equally fair to throw the conclusion into a form in which it can be most conveniently proved. But he pronounces "arguing in a circle," to be utterly unfair. It is not proper to assign that as a reason for a statement which depends for its validity upon the statement itself. This form of the fallacy is very easily detected when there are no intermediate links. When the statement and the reason, of which the reason depends upon the statement, occur one after the other immediately, then the detection becomes easy. But such absurdly glaring cases do not generally occur. It is only in long harangues and disputations that this fallacy lurks undetected. A statement is advanced as requiring to be proved. A reason is assigned for this statement, and when this reason itself is not self-evident, another reason is assigned in proof of this reason and so on, until the reason finally put forth turns out to be an assertion either manifestly the same in sense with our original statement, or evidently depending upon it for its validity. Whately mentions the case of some mechanicians that attempt to prove that every particle of matter gravitates equally. "Why?" because those bodies which contain more particles ever gravitate more strongly, *i.e.*, are heavier: "but (it may be urged) those that are heaviest are

not always more bulky;" "no, but still they contain more particles, though more closely condensed;" "how do you know that?" "because they are heavier;" "how does that prove it?" "because all particles of matter gravitating equally, that mass which is specifically the heavier must needs have the more of them in the same space." Now, evidently in the last reason, the statement proposed to be proved is tacitly assumed. The secret of detection lies in analyzing the argument into its constituent parts and removing the intermediate links.

As has been already remarked, it is not unfair to throw the conclusion into a form in which it can be most conveniently proved; but it is unfair to attempt to *deduce* the conclusion from a statement which is merely its paraphrase and nothing else. It is improper to advance that as a reason which is merely the same thing as the conclusion but clothed in different words. The diction of the English language, composed as it is of words from different tongues, affords ample scope for this form of the fallacy: *e.g.*, "to allow every man an unbounded freedom of speech must always be, on the whole, advantageous to the state; for it is highly conducive to the interests of the community, that each individual should enjoy a liberty perfectly unlimited, of expressing his sentiments."

All the cases of the imperfect dilemma may be brought under this head; for that premise of the argument in which the omission of such of the alternatives as will upset the fallacious reasoning is made, actually begs the question. We can, by dropping some important alternatives, succeed in proving any absurdity. The celebrated sophism of *Diodorus Cronus* that motion is impossible runs thus:—All that a body does, it does either in the place in which it is, or in the

place in which it is not, and it cannot move in the place in which it is, nor can it move in the place in which it is not. Thus, it cannot move at all. Here, as Jevons observes, the fallacy lies in the assumption of a premise which begs the question. Motion itself is here the act which the body in question is supposed to be doing and is merely the name of the transition from one place to another. It appears that the inventor of this sophism having got his shoulder bone dislocated, sent for a surgeon and requested him to set it right. The surgeon, in jest, answered that his shoulder bone could not have been put out either in the place in which it was, or in the place in which it was not; and therefore that it was not injured at all.

*Ignoratio Elenchi*, or *Ignorance of the Refutation*, is arguing beside the point, as overthrowing a proposition by means of another which appears to resemble its contradictory, while, in reality, it is not its contradictory. It is otherwise called the fallacy of "the Irrelevant Conclusion." It may be used either in establishing a proposition or in refuting one; for "it is substantially the same thing, to *prove* what was not denied, or to *disprove* what was not asserted." In either of these cases, it is usually the object of the Sophist to distract the attention of his hearers from the main point to be established or refuted. When he finds himself unable to establish or refute a proposition, he, by means of his rhetorical skill and the insertion of multifarious truisms, excites some emotion in his hearers which disposes them wonderfully enough to listen to him with patience and confidence, and finally succeeds in establishing or overthrowing a thesis which is likely to be mistaken for the right one. Or, he proves one proposition, and in his subsequent reason-

ings assumes another which is sufficiently like the former to be mistaken for it. If a person undertaking to establish that A has committed a certain heinous crime, proves instead that the crime which A has committed is heinous, or assumes this latter proposition in his subsequent reasonings, while only the former has been established, he is committing the fallacy of *Ignoratio Elenchi*. Sometimes also, the Sophist expatiates upon the wicked conduct of the criminal, which makes the hearers conceive a feeling of hatred towards the person and disposes them to believe that the man has actually committed the act in the present instance. Thus, the commission of the act is *practically* proved, though *theoretically* it is not. As an instance of this fallacy, Dr. McCosh quotes the following argument from Locke, intended to prove that syllogisms are useless:—"There are many men that reason exceeding clear and rightly, who know not how to make a syllogism"....."God has not been so sparing to men to make them barely two-legged creatures, and left it to Aristotle to make them rational." The establishment of these propositions does not prove the point in question. If a person, attempting to prove that after once a remission of tax is made, the Government is not justified in levying it again, proves that the people of the land are poor, then he is guilty of this fallacy. Various forms of this fallacy are generally enumerated.

*Argumentum ad hominem* (personal argument) is, when unfairly employed, a fallacious one "addressed to the peculiar circumstances, character, avowed opinions or past conduct of the individual, and therefore has a reference to him only, and does not bear directly and absolutely on the real question, as the *argumentum ad rem* does." In the course of a discussion between A and B, B advances a



proposition expressive of a certain view of his. A, finding that the admission of this proposition would foil his ultimate object by disabling him to establish his own point, starts up, accuses B of inconsistency, and declares that B is not the proper person to make the statement since on a previous occasion he has expressed a view contradictory to the one he now makes. Or, B, a drunkard, states in the course of a discussion that excessive drinking shortens life, and A, who sees that his admission of this truth would endanger his own position, argues that B cannot make that statement since his practice contradicts his theory. Thus, the conclusion in every such case is not the "absolute and general one in question, but *relative and particular*." *Argumentum ad populum* is a fallacious argument, being an appeal to the passions and fondly cherished opinions of a large body of people. If these opinions are right, then there is no fallacy. *Argumentum ad verecundiam* is "described as an appeal to our reverence for some respected authority, some venerable institution, &c." *Argumentum ad ignorantium* is the "employment of some kind of fallacy, in the widest sense of that word, towards such as are likely to be deceived by it.

There is then the fallacy of *shifting ground*, consisting in a covert attempt to shift the original ground of argument to another after failing to maintain that original position. An advocate, beginning to prove that a certain proposal is beneficial in itself, and finding that it cannot be maintained by valid arguments, changes his position and proves that some advantages may accrue from it, instead of honestly giving up the point. DeMorgan brings under this head of *Ignoratio Elenchi* all those cases in which the *Onus Probandi* is shifted from the right side to the wrong one. The burden of proof always lies on the

person that makes a positive affirmation. "A man sues another for debt, for lands sold and delivered, but the defendant declares having paid. Now the plaintiff says he can find no record of such payment in his books.....it is plaintiff's business to prove the sale from what *is* in his books, not the absence of payment from what *is not*; and it is then defendant's business to prove the payment by his vouchers." There is next the fallacy of *proving only a part of the question*. When a man stands charged with murder, it is not enough to show that he has killed a man. It must also be shown that he did it from a malicious motive and with the *intention* of causing death. We have next the "*Fallacy of objections*," which consists in rejecting a proposal for instance, on the ground that there are objections to it. This is not the point to be proved. The rejector of the proposal ought to prove that there are greater objections to it than to any new proposal which he should suggest.

*Non-sequitur*. This Latin phrase means "it does not follow." The fallacy consists in drawing a conclusion which does not follow from, or perhaps which has no connection whatever with, the premises. To suppose that, because the ground is wet, it has rained, is a *non-sequitur*. It is improper to presume that, because injury of the spleen causes death, the present case of death is occasioned by the injury of the spleen. Thus the "fallacy of the Consequent" and the "fallacy of Accidens," *i.e.*, wrong conversions of the hypothetical proposition and the Universal Affirmative, can be brought under this head. DeMorgan gives the following instance of this fallacy:—

Episcopacy is of Scripture origin.

The Church of England is the only Episcopal Church in England.

Ergo, the Church established is the Church that should be supported.

The child of Themistocles governed his mother; she governed her husband; he governed Athens; Athens governed Greece; and Greece, the world: therefore the child of Themistocles governed the world.

*Non-cause pro-cause* is an *inductive* fallacy (hence we treat of it last instead of along with *petitio principii*), committed most frequently by common uneducated people. Here also the premise or the cause is unduly assumed. It is taking that as a cause which is not a cause at all. It is imagining a causal connection to exist between two things or events when there is none of the kind. This fallacy is committed because phenomena are imperfectly observed, and induction improperly drawn. To suppose that a tree is the *cause* of its shadow is *non causa pro causa*. The character of this fallacy is better described by means of the Latin phrase *post hoc, ergo, propter hoc* (after this and therefore in consequence of this). What follows in *time* follows as a *consequence*. It is said that Whitfield attributed his being overtaken by a hailstorm to his not having preached at the last town. The falling of a meteor in a particular place is supposed to be the cause of the distresses of the king. To take the falling of the mercury as the cause of rain while it is merely its *sign* is a fallacy. As Whately observes, hurtful changes are often attributed to harmless ones. In society, men are prone to stick to established usage and customs. A slight change, however, effected in good time, would set the society in good working order. If, instead of that, this is postponed to an indefinite length of time, then enormous and even hurtful changes become unavoidable. In this case, people attribute these hurtful changes to

the first commencing act of the revolution. Another instance which Whately cites is:—"I told you that if once you began to repair your house, you would have to pull it all down." "Yes; but you told me wrong; for if I had begun sooner, the replacing of a few tiles might have sufficed. The mischief was, not in taking down the first stone, but in letting it stand too long."

Other minor fallacies are enumerated by Logicians which it is not necessary for us to describe here. We shall close this chapter with a few exercises.

### Exercises.

I. Explain clearly what is meant by 'Figure' and 'Mood.' Explain the nature and peculiarities of each of the figures. By what name is the fourth figure called and why?

II. Define "Reduction." How many methods of it are there? Reduce Baroko and Bokardo by those methods.

III. Can one mood of one figure be transmuted into another of the same figure? Illustrate your answer by concrete examples.

IV. On what grounds do some logicians reject Reduction? What have you to say about such a rejection?

V. Supply the premise suppressed in the following:—

(1) Iron gravitates because it is a material body.

(2) A can solve this problem at once since he is a good geometrician.

(3) Some Oriental monarchs are liable to be handicapped in State matters since they indulge too much in sensual pleasures.

(4) The sky being cloudy, the day is sultry.

(5) There has been no rainfall in the district and hence epidemics prevail.

(6) Failing to pass his B.A. degree examination, John was refused admission into the Law class.

(7) Wells cannot be sunk in impervious soil, and hence is this soil utterly useless for the purpose.

(8) This attempt proved a failure, since attempts that are not favoured by time and place are always unsuccessful.

VI. What conclusion will you draw from the following premises?

(1) All men are mortal and some men are wise.



(2) You have called me a fool and I always return injury for injury.

(3) If human natures be uniformly good, then there can be no society; but we see the latter flourishing.

(4) Three-fourths of the army were Prussians and three-fourths of the army were killed.

(5) A must be either a fool, or a rogue, or a mad man; but he is not a mad man.

(6) Epiminedes says that all Cretans are liars; and Epiminedes himself is a Cretan. [Give reasons for your answer.]

(7) All birds are biped and some birds are singing birds.

(8) Some precious stones are not lustrous, but all stones are hard.

VII. Frame premises for the following conclusions:—

(1) Light does not gravitate.

(2) Heat is not a material body.

(3) Heat expands bodies.

(4) Some animals are not ruminating.

(5) No liquid is compressible.

(6) Matter cannot be totally destroyed.

(7) Vedas are of divine origin.

(8) The weather is not fine to-day.

VIII. Examine the following arguments:—

(1) Idleness begets poverty and poverty is undesirable; hence idleness is also to be discarded.

(2) The army of the enemy was considered to be invulnerable since it consisted of veteran soldiers chosen from the ranks of the Prussian army.

(3) No man has a right to political power, for this latter is neither life nor property, and every man has a right to these both.

(4) Some green fruits are ripe since they are soft and soft fruits are ripe.

(5) No men are beasts; no immortal beings are men; therefore, no immortal beings are beasts.

(6) No gods are men; some animals are men; therefore, some animals are not gods.

(7) You can't hope to lift up Olympus by means of electricity, since no force can do work beyond its capabilities.

(8) All Cretans are liars; some men are not liars; therefore some men are not Cretans.

(9) Wicked men are not to be trusted; John is not to be trusted; therefore, he is a wicked man.

(10) No Christians are Hindus; some Hindus are not pious men; therefore some pious men are not Christians.

(11) It is much to be regretted that the Hindus so famous for intelligence, are so sadly wanting in union; and this is to be accounted for by their blind adherence to the long-standing institutions of the country which, together with the various creeds and systems of caste, has created hopeless breaches among them.

(12) It is argued that the lower animals have no right to the benefits of the moral law, since they do not satisfy the conditions of such a right.

(13) Some graduates do not fulfil the charge they have undertaken to execute; but all graduates are men of culture; thus, some men of culture are not alive to the duties they have to perform.

(14) Liars are not trustworthy men; all trustworthy men have benevolent motives; therefore some benevolent men are not liars.

(15) All the fish that the net enclosed were an indiscriminate mixture of various kinds: those that were set aside and saved as valuable, were fish that the net enclosed: therefore those that were set aside, and saved as valuable, were an indiscriminate mixture of various kinds.—*Whately*.

(16) Some plants are sensitive: all sensitive objects possess growth: hence some objects that possess growth are plants.

(17) If it be fated that you recover from your present disease, whether you call in a doctor or not, you will recover; again, if it be fated that you do not recover from your present disease, whether you call in a doctor or not, you will not recover; but you are destined either to recover or not to recover: hence the services of a doctor, are of no use. (*Vide* Monck's "Introduction to Logic.")

(18) If it has been ordained that I should become distinguished in this world, I shall become one such, whether I exert myself or not: again, if it has been fated that I should not become distinguished, I shall be so whether I exert myself or not: one of these states must have been designed for me: hence no exertion on my part is necessary. (This and the above argument turn upon the doctrine of the Irrevocability of fate—*Vide* Monck's Logic.)

(19) All poets are moralists: some of them are poor: therefore some poor people are moralists.

(20) If a man seeks to know if all the virtues are uniform in the minds of people, I would tell him that they are not: for though these are sources of happiness, yet the sources of happiness, we know, differ according to individuals, time, place and circumstances.

(21) It can be stated without any fear of contradiction that some people possessing hot temper are editors of newspapers: for, these style themselves critics and critics are always characterized by that spirit.

(22) Protection from punishment is plainly due to the innocent; therefore as you maintain that this person ought not to be punished, it appears that you are convinced of his innocence.

(23) All the most bitter persecutions have been religious persecutions: among the most bitter persecutions were those which occurred in France during the Revolution, therefore they must have been religious persecutions.

(24) It must be admitted, indeed, that a man who has been accustomed to enjoy liberty cannot be happy in the condition of a slave: many of the Negroes, however, may be happy in the condition of slaves, because they have never been accustomed to enjoy liberty.

(25) That man is independent of the caprices of fortune who places his chief happiness in moral and intellectual excellence: a true philosopher is independent of the caprices of fortune: therefore a true philosopher is one who places his chief happiness in moral and intellectual excellence.

(26) Logic is indeed worthy of being cultivated, if Aristotle is to be regarded as infallible: but he is not; logic, therefore, is not worthy of being cultivated.

(27) Meat and drink are necessities of life: the revenues of Vitellius were spent on meat and drink: therefore, the revenues of Vitellius were spent on the necessities of life.

(28) Nothing is heavier than platina: feathers are heavier than nothing: therefore feathers are heavier than platina.

(29) All the nobles of the kingdom show a dislike to the existing form of Government: all these nobles possess all the power in the State. Thus, some people that possess all the power in the State show a dislike to the existing form of Government.

(30) All reforms as regards matters of Government invariably cost much bloodshed: and events that render bloodshed unavoidable are to be carefully prevented from occurring: thus then some events, the occurrence of which should be carefully avoided, are reforms.

(31) Happiness is obtained by virtue: virtue is right-doing: right-doing is the doing of action neither too much nor too little. Happiness, therefore, consists in the right measure of actions.

(32) Gymnastic education was considered by Plato as absolutely necessary, since movement of the body is the only proper remedy for the diseases and disorders of the system which render the carrying out of his educational theory an impossibility.

(33) If a story is reported by A, I never believe it: this story, I do believe; hence it was not reported by A.

(34) A vacuum is impossible, for if there is nothing between two bodies they must touch.....(J. S. Nicholson as given in Mr. Keynes' book).

(35) If he pleads that he did not steal the goods, why, I ask, did he hide them, as no thief ever fails to do? (Dr. Venn, as in Dr. Keynes').

(36) Any course of study without logic entering into it is ineffective as a means of sharpening the intellect: many Universities adopt such a course of study: therefore many Universities adopt a course ineffective as a means of sharpening the intellect.

(37) Heat expands bodies; friction causes heat: therefore, friction expands bodies.

(38) If the ruler is unjust, the subjects suffer: the subjects *do* suffer: therefore the ruler is unjust.

(39) Mr. So-and-so does not take his fees if the case he handles proves a failure: this case has proved a success: therefore Mr. So-and-so *does* take his fees for it.

(40) If confession can purify the soul of man, then none will lose the opportunity of making it: every man has faith in it and does make it: therefore, confession has that virtue of purifying the soul of man.

(41) Since the end of poetry is pleasure, that cannot be unpoetical with which all are pleased.....Dr. Keynes.

(42) It is quite absurd to say "I would rather not exist than be unhappy," for he who says "I will this, rather than that," chooses something. Non-existence, however, is no something, but nothing, and it is impossible to choose rationally when the object to be chosen is nothing.—Dr. Keynes.

(43) It is unwise to suppress a rebellion by means of force when the rebellion springs from a fault not of the rebels but of the Government: for, such a suppression, though it secures peace for the time being, yet, by leaving a smouldering fire in the minds of the rebels, ultimately brings ruin on the State.

(44) Salvation is an end worthy of our attempt; freedom from sin is the path to salvation: hence, freedom from sin is the path to an end worthy of our attempt.

(45) Some persons of distinction regard themselves as infallible, and, by means of their influence, force their views and opinions upon their neighbours. This creates discontent among the latter who, in consequence, unite themselves to counteract the effect of influence, and disable them from enjoying the benefits of friendship. Thus, their interests remain supportless in times of necessity.

(46) None but those who are contented with their lot in life can justly be considered happy. But the truly wise man will always make himself contented with his lot in life, and therefore he may justly be considered happy.

(47) All intelligible propositions must be either true or false. The two propositions "Caesar is living still," and "Caesar is dead," are both intelligible propositions; therefore they are both



true, or both false.—(Solly, Syllabus of Logic as given in Dr. Keynes' book).

(48) You are not what I am : I am a man : therefore, you are not a man.

(49) Those only who are friends of God are happy : now, there are rich men who are not friends of God : there are rich men who are not happy.

(50) Either our soul perishes with the body, and thus, having no feelings, we shall be incapable of any evil ; or if the soul survives the body, it will be more happy than it was in the body ; therefore, death is not to be feared.—(Port Royal Logic as in, Dr. Keynes' book).

(51) If the hour-hand of a clock be any distance (suppose a foot) before the minute-hand, this last, though moving twelve times faster can never overtake the other ; for while the minute-hand is moving over those twelve inches, the hour-hand will have moved over one inch : so that they will then be an inch apart ; and while the minute-hand is moving over that one inch, the hour-hand will have moved over  $\frac{1}{12}$  inch, so that it will still be ahead ; and again, while the minute-hand is passing over that space of  $\frac{1}{12}$  inch which now divides them, the hour-hand will pass over  $\frac{1}{144}$  inch ; so that it will still be ahead, though the distance between the two is diminished ; &c., &c., and thus it is plain we may go on for ever ; therefore the minute-hand can never overtake the hour-hand.

(52) Theft is a crime : theft was encouraged by the laws of Sparta : therefore the laws of Sparta encouraged crime.

(53) What we eat grows in the fields : loaves of bread are what we eat : therefore loaves of bread grow in the fields.

(54) Animal-food may be entirely dispensed with : (as is shown by the practice of the brahmins and of some monks) and vegetable-food may be entirely dispensed with (as is plain from the example of the Esquimaux and others) ; but all food consists of animal-food and vegetable food : therefore all food may be dispensed with.

(55) He who is most hungry eats most : he who eats least is most hungry : therefore he who eats least eats most.

(56) Wilkes was a favourite with the populace : he who is a favourite with the populace must understand how to manage them : he who understands how to manage them, must be well acquainted with their character : he who is well acquainted with their character, must hold them in contempt : therefore Wilkes must have held the populace in contempt.—Whately.

(57) Henry is wiser than Thomas ; Thomas is wiser than John ; hence Henry is wiser than John.

(58) One symptom of fever is thirst ; Mr. So-and-so is thirsty ; hence Mr. So-and-so has fever.

(59) 'Most men that make a parade of honesty are dishonest; this man makes a parade of honesty.' Hence this man is dishonest.

(60) 'A good marksman must have a steady hand; George has a steady hand; therefore George is a good marksman.'

(61) A crocodile caught a child and then tells the mother, "if you will tell me truly whether I will resolve to eat the child or not, I will give it up to you." Examine the various replies which the mother can give and their consequences. Substitute the phrase *in fact eat* for *resolve to eat* and then discuss the propriety of the crocodile's promise. (For a discussion of this and the above sophism, the student is referred to Monck's Introduction to Logic.)

(62) All causes precede their effects. The Nature of a substance cannot be its cause since it (Nature) acquires existence either along with the substance itself or on some after-date.

(63) As no man grudges himself time to sleep, so none should grudge idleness of childhood; for, childhood is the sleep of reason.

(64) Christians alone are merciful; John is a Christian; therefore John is merciful.

(65) None but the wicked deserve to be punished; this man deserves to be punished; therefore, he is wicked.

(66) Supposing the existence of a Supreme Being as the creator of the Universe, we need not suppose another creator for this Supreme Being, since we need inquire into the cause only of that which we do actually see.

(67) Believers in Fatalism are immoral; this man is immoral; therefore he is a believer in Fatalism.

(68) "Some objects of great beauty answer no other perceptible purpose, but to gratify the sight: many flowers have great beauty; and many of them accordingly answer no other purpose but to gratify the sight."

(69) "If all men were capable of perfection, some would have attained it; but, none having done so, none are capable of it."

XIX. Dr. Johnson remarked that "a man who sold a penknife was not necessarily an ironmonger. Against what logical fallacy was this remark directed? (Cambridge).

---

## MADRAS UNIVERSITY B. A. QUESTIONS.

1880.

I. Define Logic, explaining your definition fully, and comparing it with such others as are known to you. In what relation does Logic stand to the other sciences?

II. What reasons are there for discussing names in Logic? Classify names. Distinguish an abstract from a general name, and illustrate the use and abuse of abstract names.

III. Give Aristotle's categories. What purpose were they intended to serve and how do they fulfil it? Give Mill's substitute.

IV. What are verbal (essential, explicative) propositions? With what class are they contrasted? Show how the distinction made is limited. Into what generalities, according to Bain, is predication resolvable, and why is the analysis made? State (1) Hamilton's and (2) Mill's theory of predication.

V. Enumerate, explain and exemplify the forms of immediate inference. Give an example of the Dilemma, and state the points to which you would give attention in testing its validity.

VI. Show the position of the terms in each of the four figures. What special value attaches to each figure? On what grounds does Hamilton hold that the fourth should be abolished?

VII. Give, explaining where necessary, the special canons of the syllogism, and apply them to the argument—'Logicians deal with proof or evidence, a function which belongs to judges; therefore some judges are logicians.'

VIII. Give concisely the opinions of Hamilton, Mill and Bain regarding the importance and character of the principles of Identity, Contradiction and Excluded Middle.

IX. 'Syllogizing is the philosophic analysis of the mode in which all men reason and must reason if they reason at all.' Examine this: stating what different views are held, on what grounds, and, according thereto, what purposes the syllogistic form serves.

X. Describe the results to the Science of Logic of the doctrine of the quantification of the predicate.

1881.

I. What are the main sub-divisions of Logic? Describe the nature of each, and give a very brief sketch of their history. Does Logic expound the laws that actually govern, or the laws that ought to govern, the reasoning processes?

II. Is Logic concerned with names, thoughts, or things? Show how the answer to this question affects our views as to the final import of the proposition.

III. What is a concept or general notion? How do Realists, Conceptualists and Nominalists differ regarding it? Distinguish between (1) the psychological, (2) the logical, and (3) the ontological or metaphysical aspects of this famous controversy.

IV. Distinguish between and exemplify—(a) Connotative and non-connotative names. (b) The clearness and the distinctness of notions. (c) Extension and comprehension as applied to (1) Notions, and (2) Propositions. (d) The quality and the quantity of propositions. (e) Predicate, predication, predicable and predicament. (f) Verbal and real propositions. (g) The logical “some” and the “some” of common speech.

V. Give the contradictory, converse and obverse (formal and material) of the following propositions—(a) Never put off till to-morrow what you can do to-day. (b) None but Asiatics are Hindus. (c) All the candidates have not passed. (d) An undevout astronomer is mad.

VI. A. B. makes a universal denial, which you believe to be untrue. Would you try to refute it by means of its contrary or its contradictory? Give your reasons.

VII. What is meant by the quantification of the predicate, and how does it affect the ordinary doctrines of Opposition, Conversion, and Obversion? Examine by the help of concrete instances the additional propositional forms with a view to show whether the introduction of them is (1) logically justifiable and (2) practically advisable.

VIII. (a) “Real learning is too valuable a thing to be within the grasp of the idle.” Expand into a syllogism, stating figure and mood.

(b) “Some graduates do not support and promote the cause of morality and sound learning, though they have all pledged themselves to do so; therefore some who have pledged themselves to support and promote the cause of morality and sound learning, fail to keep their promise.” Reduce ostensively and by *reductio ad impossibile*.

(c) “Man has longings and aspirations after immortality; hence we have an indication that he is destined to be immortal.” What is the immediate major premise, and what proposition does it ultimately fall back upon?

(d) In reply to a statistical argument Mr. Canning exclaimed—“Not figures, but facts.” Express his reasoning syllogistically.

IX. Is the syllogism a case of *petitio principii*? Discuss this so as to bring out—(a) The proper function of the syllogism; (b) the



exact points in the reasoning process at which the step from the known to the unknown is made.

### 1882.

I. State and criticise the definitions of Logic given by The Port Royal Logic, Whately, Hamilton, Mill, and Dr. Bain.

II. With regard to the three leading departments of Logic state, with the needful explanations—(a) their historical order; (b) their logical order; and (c) their didactic order, *i.e.*, the order in which, they should enter into a curriculum of studies.

III. On what grounds does the process of obversion rest? Obvert, if possible, the propositions A, E, I, O, U, Y,  $\neg$  and  $\omega$ , using S and P as terms. How does Dr. Bain distinguish between formal and material obversion? Is the distinction one with which Logic is concerned? Give the opposites, obverse, and converse of the following propositions, and state with reasons, whether they are verbal or real:—(1) Swear not at all. (2) To be or not to be, that is the question. (3) The mind thinks always. (4) The mind is united with a material organism.

IV. State, explain, and criticise the leading views that have been advocated with respect to the import of propositions. From the point of view of import what is the smallest number of classes to which propositions may be deduced? To what part of the proposition does Modality, Tense, and the Negative Sign belong? Give reasons.

V. Distinguish between (a) a logical whole, (b) a metaphysical whole, (c) a physical whole (i) mechanical and (ii) chemical. Describe the process by which each kind of whole is resolved into its parts.

VI. Discuss and compare the various modes of stating the fundamental axiom of the syllogism, and deduce from it the special syllogistic rules.

VII. What is the end aimed at by all systems of syllogistic notation? Describe and compare the systems of Euler, Lambert and Hamilton, stating which you think the best and why? Represent by each of these modes *Darii*, *Camestres*, *Bohardo* and *Fesapo*.

VIII. Should conditional and disjunctive arguments be brought under Mediate or Immediate Inference? Give reasons.

IX. Prove—(a) That the second figure can give only negative, and the third figure only particular, conclusions. (b) That a syllogism in the fourth figure cannot have O as a premise nor A as a conclusion. (c) That in the Aristotelian Sorites no premise can be particular except the first, and none negative except the last; and that in the Goalenian Sorites no premise can be particular except the last, and none negative except the first. (The Sorites to be interpreted in extension only.)

X. Throw the argument of each of the following extracts into its strictly logical form, subordinating or omitting as far as possible the extraneous or explanatory matter:—(a) "But concerning innate principles, I desire these men to say whether they can or cannot, by education and custom, be blurred and blotted out; if they cannot, we must find them in all mankind alike, and they must be clear in every body; and, if they may suffer variation from adventitious notions, we must then find them clearest and most perspicuous nearest the fountain, in children and illiterate people, who have received least impression from foreign opinions. Let them take which side they please, they will certainly find it inconsistent with visible matter of fact and daily observation."—Locke. (b) While affirming that virtue is naturally the happiness and vice the misery of man, Butler puts the case of a man who is not convinced of this happy tendency of virtue or is of a contrary opinion, and then proceeds as follows to inquire how such a man would stand related to the obligations of the moral law:—"One may say more explicitly that leaving out the authority of reflex approbation or disapprobation, such a one would be under an obligation to act viciously; since interest, one's own happiness, is a manifest obligation, and there is not supposed to be any other obligation in the case. But does it much mend the matter, to take in that natural authority of reflection? There indeed would be no obligation to virtue; but would not the obligation from supposed interest on the side of vice remain? If it should, yet to be under two contrary obligations, *i.e.*, under none at all, would not be exactly the same, as to be under a formal obligation to be vicious, or to be in circumstances in which the constitution of man's nature plainly required that vice should be preferred. But the obligation on the side of interest really does not remain. For the natural authority of the principle of reflection, is an obligation the most near and intimate, the most certain and known; whereas the contrary obligation can at the utmost appear no more than probable; since no man can be *certain* in any circumstances that vice is his interest in the present world, much less can he be certain against another; and thus the certain obligation would entirely supersede and destroy the uncertain one; which yet would have been of real force without the former."—Butler.

---

### 1883.

I. What are called the Fundamental Laws of Thought? Discuss the question whether they are laws to which Thought *does* conform or *ought* to conform.

II. (1) (a) "Some flowers are white." (b) "Some X's are not some Y's." (c) "Every regular rectilinear figure may be inscribed in a circle." (d) "P struck Q." Express (a) intensively; give the contradictory of (b); contraposit (c); and convert (d).

(2) (a) "If A is not B, C is D." (b) "If A is not B, either C is D or E is not F." Give the valid moods with each of the above as major.

(3) "Not only we do not (unless exceptionally for some special purpose) quantify the predicate in thought, but we do not even quantify the subject in the sense which Sir W. Hamilton's theory requires."—Mill. Explain.

(4) "Europeans are divided into Kelts, Teutons, Slaves, Frenchmen, Spaniards, the Emperor of Russia and the President of the United States." What rules of Logical Division are violated here?

III. State and criticise the leading views as to the Import of Propositions. What is the importance in a treatise on Logic of an Analysis of the Import of Propositions?

IV. Distinguish between—(1) Formal and Conceptualistic Logic. (2) Formal and Material Truth. (3) Substitutive and Attributive Judgments. (4) Substance and Attribute.

V. Explain (1) "In necessary matter, all affirmatives must be true, and all negatives false." (2) "The abstract name is the last product of generalisation, alike the facility and the snare of general expression." (3) "In the Natural Kinds verbal predication is apt to be confounded with real." Bain holds a peculiar view of verbal predication? (4) "The Eulerian diagrams and the ordinary four propositions are based on two different theories of predication." (5) "If all syllogisms were of the type of Barbara, I doubt whether syllogisms would ever have been invented."—Bain.

VI. What, according to Hamilton, is the one canon of syllogism which abrogates the special laws of syllogism? Shew that, with his eight propositions, there will be four valid moods in the second figure each having A for its minor.

VII. What are called the Weakened Moods of the syllogism? Show that, if the middle term be distributed in both the premises, the conclusion will be particular; and that if the conclusion be universal, the middle term will be distributed only once in the premises. Reduce *Fesapo* and *Camestres* ostensively and by *reductio ad impossibile*. If *k* stands for obversion, show that the moods "Baroko" and "Bokardo" may be replaced by *Faksoko* and *Doksamosk*.

VIII. Criticise—(1) "In the hypothetical syllogisms the minor and the conclusion indifferently change places."—Mansel. (2) "Logicians have erroneously asserted that singular names are devoid of meaning in intension, the fact being that they exceed all other terms in that kind of meaning."—Jevons. (3) "Men were led to class solely for the purpose of economising in the use of names."

—J. Mill. (4) Against the rejection of IEO, the following syllogism is advanced :—

I—Some men are Hindus.

E—No Hindus are Europeans.

O—(Therefore) Some men are not Europeans.

(5) "Carpenters can't be handsome, for tall men are often handsome, and it is not every carpenter that is tall."

IX. Why do Mill and Bain object to the Dictum? Dr. M'Cosh says that Mill's new Dictum is only a bad version of the old? Dr. Bain himself thinks that Mill's syllogistic theory does not touch syllogism proper?

### 1884.

I. Criticise the following definitions of Logic :—

Logic is (a) "the Right use of Reason ;"

(b) "the Science of the necessary laws of thought ;"

(c) "the Science of avoiding fallacy."

II. (a) "It is our son John ;"

(b) "To-day precedes Friday ;"

(c) "A is equal to B ;"

(d) "All X is all Y ;"

(e) "Not all men are happy ;"

(f) "A is either B or not C."

What proposition is (a) ; convert (b) and (c) ; contradict (d) ; contraposit (e) ; give the hypothetical equivalents of (f).

III. How does Dr. Bain show that the class theory of propositions is "inadequate and incorrect?"

What is his classification of propositions according to their import? Why does he reject from his classification propositions predicating existence?

IV. Explain :—

(a) "Incomplete definitions are useful abbreviations, but may be and are continually set aside in the progress of science."

(b) "The illusive case in the dilemma is when the logician trusts to the law of excluded middle as a guarantee of the disjunction."

(c) Does the "Dictum" strictly considered apply to all the moods of the First Figure?

(d) Referring to 'Baroko' Dr. Bain says "that a glance at the premises shows that they are not at bottom what they appear on the surface."



## V. Criticise:—

(a) "If O is true, A is false; therefore I is false; therefore E is true."

(b) "If there were but one rational being in the Universe, that being might be a perfect logician."

(c) "The extent of the middle term," says Dr. Bain, "relatively to the extent of the major and minor, gives rise to variations" of figure.

VI. Give one example of each of the following:—(a) An enthymeme of the third order. (b) An Aristotelian Sorites with a negative conclusion. (c) Fallacy of Ambiguous Middle. (d) A legitimate conclusion from two particular premises. (e) An Epicheirema.

## VII. Explain the following:—

(a) If the predicate is not quantified in thought, then what, asks Hamilton, is the foundation for conversion per accidens.

(b) "The axiom of deduction supposes the uniformity of nature."

(c) "To represent the relation of terms in a syllogism by that of figures in a diagram is to lose sight of the distinctive mark of a concept—that it cannot be presented."—Mansel.

(d) "The prime importance of the syllogism attaches to its standard forms: that is, to the First Figure."

VIII. Give and criticise the different ways in which the charge of *petitio principii* brought against the syllogism has been met; and state and support what appears to you to be the correct theory as regards the function of the syllogism.

Why does Dr. Bain object to the *nota nota* as the basis of the syllogism?

IX. State and criticise the objections which Dr. Bain urges against syllogisms with singular premises.

Reduce (1) "Bramantip" to the second figure. (2) The weakened mood AEO of the second figure to the first. (3) The following to a syllogistic mood:—"No perfect being can be man; for all men are subject to decay, the unfailing mark of imperfection."

If the major premise of a syllogism be particular, and the minor negative, what must the other premise be?

---

1885.

## I. Examine the following:—

(i) Formal Logic deals exclusively with names.

(ii) Formal Logic is a collection of rules for thinking grounded on a scientific investigation of valid thought.

II. (i) How do the Predicables illustrate the distinction between Verbal and Real Predication?

(ii) Point out the relations of Genus, Species, Difference, Property, and Accident respectively, to the connotation of the subject of which they are the predicates.

III. State the views of Dr. Bain and Sir W. Hamilton regarding the nature and purpose of the Categories of Aristotle.

IV. State the different views held by Logicians regarding the Import of Propositions, and indicate, with reasons, the one you adopt. What does Dr. Bain mean by the 'Judgment theory' of propositions, and what are the 'defects inherent' in it?

V. State and criticise Hamilton's doctrine of the thorough-going Quantification of the Predicate. Do you consider Bain's criticism of Hamilton's additions to E and O as valid?

VI. State and criticise the several views that have been advanced regarding the position and treatment of modals in Logic.

VII. Logicians differ as to whether Immediate Inference is real inference or not. Discuss this point. Discuss the question whether the Hypothetical syllogism is a case of Immediate or Mediate Inference.

From all S is P, infer (i) All not-P is not S, and (ii) Some not-S is not P.

From no S is P, infer Some not-S is P.

VIII. "It is the peculiarity of the Syllogism," says Dr. Bain, "that the conclusion does not advance beyond the premises." How would you reconcile this statement with the real accessions to our knowledge made by the deductive process? How does Mill meet the charge of *petitio principii* brought against the syllogism?

IX. (a) Some Logicians have held that a syllogism in any other than the first figure must be reduced to that figure in order that its validity may be conclusively established. State, with reasons, whether you agree with this or not.

(b) In objecting to the fourth figure, Hamilton grounds his dislike on the circumstance, that the premises proceed in the whole of comprehension while the conclusion is drawn in the counter whole of extension. Explain and exemplify. State, with reasons, whether you would retain or reject the fourth figure?

X. Given the truth of one premise and of the conclusion, can we establish truth of the other premise?

XI. It has been pointed out that certain arguments are more naturally put in one than in any other of the first three figures.

Put the following arguments into syllogistic form, and in the figures that best suit them respectively:—

(1) How can any one maintain that pain is always an evil, who admits that remorse involves pain, and yet may sometimes be a real good?

(2) We have no right to treat heat as a substance, for, it may be transformed into something, which is certainly not a substance, namely, mechanical work.

(3) Aristotle asks how it is possible to identify "Will" with "Wish," and argues that we often wish for what we know to be impossible, while the object of our volition, is always something that is conceived to be within our power.

### 1886.

I. Define 'Deductive Logic' with reasons for the view you adopt. State the ultimate assumption or assumptions of Formal Logic as held by Hamilton and Bain. Discuss, stating your view with reasons.

II. Different views are held as to the fundamental type of all reasoning. State these, and give your own view with reasons.

III. (a) Classify Propositions logically :—(1) on the principle of External form; (2) on the principle of Import or Meaning.

(b) Is the *predicate* to be interpreted in comprehension or in extension?

IV. (1) Given that the major term is distributed in the premise and undistributed in the conclusion of a valid syllogism, find directly the mood and figure.

(2) Is there a valid conclusion to either premise from the other premise and the conclusion, in the valid moods of the Third Figure?

V. (a) Give an example of a valid argument which cannot be exhibited in ordinary syllogistic form.

(b) Throw the following into syllogistic forms and examine their validity :—

1. "Those who bribe should not, any more than any other law-breakers, be exempt from punishment."

2. "Persons who pretend to form an opinion on philosophic subjects are oftentimes incapable of doing it properly from want of acquaintance with the exact sciences."

3. "Many things inexpedient because wrong, are apparently useful."

4. "Some things which are not much written about are not worth learning; not that this circumstance is otherwise an index, except in this manner, that all really useful learning has its opponents and it is only where there is opposition that much discussion ever takes place."

VI. Explain :—

(1) A particular proposition is only 'a may be particular.'

(2) The affirmation of a universal proposition or the denial of a particular one enables us to affirm or deny all the other three ;

but the denial of a universal proposition or the affirmation of a particular one leaves us unable to affirm or deny two of the others.

(3) Mediation, alleged to be the peculiar attribute of the syllogism, may be admitted to be an indication of some complexity in the syllogistic process, but cannot be viewed as the basis of a distinction in *kind* between it and the various forms of immediate inference.

VII. Shew that in the ordinary sorites (1) only one premise can be negative and it must be the last, and (2) only premise can be particular and it must be the first.

VIII. (1) On what grounds has it been held that Hypothetical Syllogisms are cases of immediate inference? (2) 'Either A is B, or C is D'; give its equivalent hypothetical. (3) Is "If A is B, C is not D" the contradictory of "If A is B, C is D"? (4) To what fallacy of the categorical syllogism is the fallacy of 'affirming the consequent' reducible? (5) What is a Dilemma? Whence its illusory nature? Give an example of its legitimate use from Geometry.

---

### 1887.

I. What position does Logic occupy in a classification of the sciences? How, in particular, is it related to Psychology?

Discuss the question whether Logic is concerned with names, thoughts, or things.

When Locke said, in criticism of the scholastic Logic, that "God has not been so sparing to men to make them barely [merely] two-legged creatures, and left it to Aristotle to make them rational," what misconception was he under as to the function and value of Logic?

II. It is said that every real notion has a corresponding opposite notion also real. Explain and apply this. If accepted, would it justify us in treating all propositions as affirmative?

III. Is the distinction between verbal and real propositions absolute or relative? Give reasons for your answer.

What is an "essential" proposition, (1) according to Scholastic Realism, (2) according to Modern Nominalism?

Are there any propositions which predicate mere existence?

IV. State and explain the so-called fundamental laws of thought, and estimate their logical value.

V. Point out the chief merits and defects of the new propositional forms gained by Hamilton in quantifying the predicate.

Hamilton says that the quantification of the predicate postulates that we are at liberty to express in language all that is implied in thought. Is the postulate admissible? Discuss the question whether the quantity of the predicate is or is not implied in thought.



In which of its meanings is "some" used when the doctrine of the quantification of the predicate is adopted?

VI. Discuss and compare the various modes of stating the fundamental axiom of the syllogism and deduce from it the special syllogistic rules.

What is the function of the major premise of the syllogism? Justify your answer.

---

### 1888.

I. What is a concept? How are concepts formed and what purpose do they serve?

II. Do judgments (or propositions) deal with words, notions or things?

III. Discuss the question whether what is called "immediate inference" be, or be not of the nature of inference.

IV. Every syllogism is in reality a case of *petitio principii*. Explain and criticise this statement.

V. Construct a syllogism in *Bocardo*, and reduce it to a mood in the first figure.

VI. In what way does Hamilton's quantification of the predicate affect—(1) the meaning of the copula, (2) the conversion of propositions, (3) the doctrine of moods and figures?

VII. Examine the following reasonings. Reduce them to the form of categorical syllogisms. State whether valid or invalid, and if invalid, to what class of fallacies each belongs:—

(1) I shall not pass this examination, for, although I should have done so had I read Bain's "Logic," I neglected to read that book.

(2) "The farther your neighbour lives from you, the more you are bound to be true in your dealings with him, because your power over him is greater in proportion to his ignorance, and his remedy more difficult in proportion to his distance."

(3) "Impossible events happen almost every day; but what happens almost every day is a very probable event; therefore improbable events are very probable events."

VIII. Discuss the doctrine of modality.

---

### 1889.

I. Give, with reasons, the definition of Logic which you consider the best. How would you define Deduction? How do you account for the Baconian and post-Baconian opposition to deductive Logic? What is the precise function of deduction in scientific enquiry?

II. Distinguish between verbal and real predication, and show, with reference to each of the predicables, whether it belongs to the one or to the other. Give an instance to show that the distinction is sometimes relative to the state of knowledge of the individual.

III. Estimate the value of the reasons for and against the quantification of the predicate.

IV. What is the distinction usually drawn between Immediate and Mediate Inference? What objection does Mill raise to so-called Immediate Inference being called inference? Is hypothetical inference mediate or immediate? Give reasons for your answer.

V. On what principle does obversion depend? Is it applicable to all classes of propositions? What is the obverse of, 'Evil be to him that evil thinks'?

VI. Give an instance of a numerically-definite syllogism, and point out what advantages this form of syllogism has over the ordinary scholastic form.

VII. What constitutes a science deductive? In Comte's classification of the Sciences, which would you call deductive, and which inductive? Give your reason in each case.

### 1890.

I. Discuss briefly the question whether the proper province of Logic is *formal* truth only, or *material* truth only, or whether it should include both. Is there any kind of truth which unquestionably lies outside the province of Logic?

II. Define the question that is discussed under the designation of the *import of proposition*.

State the chief views that are held on that question, and indicate, with reasons, those you reject.

III. State and exemplify the logical uses of the Second and Third Figures, respectively.

Give the history of the origin of the Fourth Figure, and state for what various reasons that Figure is rejected by some logicians.

IV. State the principle on which *Reductio per impossibile* proceeds. Why was that mode of reduction adopted in the cases of *Baroko* and *Bokardo*?

Reduce either of these moods to the other, directly.

V. It is maintained by some that syllogising is not real inference. What, then, in the view of these, is real inference and what is the nature of syllogising?

VI. (i) Explain and illustrate the statement: "We must reject the claims that have been put forward in behalf of the syllogism to be the exclusive form of deductive reasoning."

(ii) Criticise the following statement :

"Every conditional proposition may be regarded as a Universal Affirmative."

VII. Compare the methods of Logical Notation adopted by Euler, Lambert, and Hamilton, respectively, and estimate their respective merits.

---

### 1891.

I. State Mill's view of the province of Logic and contrast it with that of Hamilton.

II. Discuss the different views that are held as to the relation between the connotation of a general name and the properties of the corresponding class.

III. Criticise the scheme of propositional forms drawn up by Hamilton on the basis of his doctrine of quantification.

IV. Discuss the question of the logical foundation of Immediate Inference.

V. State clearly the theory of inference which is implied in Mill's account of the syllogism. What is its merit, and what its defect, as compared with the traditional theory?

VI. Complete and reduce to syllogistic form the following argument:—

A truth should not be neglected because it seems unpractical; for many truths that seem unpractical prove upon trial to be applicable to practice.

---

### 1892.

I. Distinguish between the spheres of Logic and Psychology.

What views are held by material and formal logicians respectively as to the scope and aim of Logic?

Which do you think is the correct view?

II. Why should the question of the import of propositions find a place in Logic?

Discuss briefly, the views that have been held on the import of propositions.

III. What objections have been taken to the *Dictum de omni et nullo* as the basis of deductive reasoning?

Is J. S. Mill's amended formula an improvement on the *dictum*?

Discuss the logical value of the fourth figure.

IV. (1) Examine the grounds on which it is stated that a syllogism with two singular premises cannot be viewed as a genuine deductive inference.

(2) Jevons says that from two negative premises a conclusion may be drawn, and adduces the following as an example:—

Whatever is not metallic is not capable of powerful magnetic influence.

Carbon is not metallic, therefore Carbon is not capable of powerful magnetic influence.

Enquire whether the example bears out Jevons' statement.

V. 1. Some rational beings are not polite because some philosophers are not polite:—

Express this as a syllogism in the third figure and reduce it directly to the first figure.

2. Test the following arguments:—

(a) None but Hindus observe caste. Englishmen are not Hindus, therefore Englishmen do not observe caste.

(b) None but Hindus observe caste. All Bengalis are Hindus, therefore all Bengalis observe caste.

VI. The syllogism is regarded by some logicians as the most glaring instance of the fallacy of *petitio principii*. Is the criticism valid?

Professor Bain says that Mr. John Stuart Mill has extricated the syllogism from the puzzle and that the consequence has been a total revolution in Logic. Discuss this statement.

1893.

I. Logic has been described as a *regulative* science. Explain the significance of the epithet. How is *language* related to the subject-matter of Logic?

II. (i) Give the contrary and, where possible, the contradictory of the following propositions:—

(a) Man never is, but always to be best.

(b) One truth is clear, whatever is, is right.

(c) He was an Englishman, and either a lawyer or a physician.

(d) Britain has often been at war, and has acquired foreign possessions.

(ii) Define contraposition. State the following propositions in logical form, and give the converse and the contrapositive of each:—

(a) A wise son maketh a glad father.





(b) He that increaseth knowledge increaseth sorrow.

(c) Unto the pure all things are pure.

(d) There is no new thing under the sun.

III. State and briefly discuss Hamilton's theory of judgment.

IV. Define the place and importance in Logic of the principles known as the fundamental laws of thought.

V. (i) Enumerate the legitimate moods of the first figure, on the supposition that either the subject of the second premise, or the predicate of the first, may become the subject of the conclusion.

(ii) Represent a syllogism in Celarent by means of any of the recognised moods of notation.

(iii) Exhibit the following argument in the form of a Simple Constructive Dilemma:—Nevertheless a man who is devoid of either gentleness or spirit cannot possibly make a good guardian. And as they seem to be incompatible, the result is, that a good guardian is an impossibility.

VI. (i) What relations of opposition subsist between the quantified forms, A, I, U, Y, on the assumption that 'some' means 'some at most'?

(ii) How does the Quantification of the Predicate affect (a) the doctrine of figure, (b) the doctrine of mood?

VII. The syllogism has been said to be a *petitio principii*. What is the ground of this objection, and how must the nature of syllogistic reasoning be conceived in order to avoid it?

VIII. Explain the meaning of the term 'necessary' as applied to propositions, and determine whether 'necessity' can be recognised as a test of truth.

IX. State the following arguments in complete syllogistic form:—

(i) As long as it is allowed that reason has no influence on our passions and actions, 'tis in vain to pretend that morality is discovered only by a deduction of reason.

(ii) Yet still they (real things) are *ideas*, and certainly no idea can exist otherwise than in a mind perceiving it.

(iii) A virtuous motive is requisite to render an action virtuous. An action must be virtuous, before we can have a regard to its virtue. Some virtuous motive, therefore, must be antecedent to that regard.

---

1894.

I. Is Logic correctly spoken of as the Science of Inference? If so, what different views of the province of Logic arise from this definition?

Discuss the relation between Logic and Psychology.

Enumerate some of the Psychological questions that are usually discussed in Deductive Logic.

II. (i) In what different senses have the terms "Connotation" and "Denotation" been used?

Give the logical characteristics of *humanity*, *His Excellency*, *cause*, *equal*.

(ii) State the rules of logical division and show why only a general term is capable of logical division.

III. (i) How would you treat the following propositions in Logic?—

(a) Every man is not wise.

(b) All the three I met yesterday have left town.

(c) Hindus alone observe caste.

(d) Consciousness is immediate knowledge.

(e) Uneasy rests the head that wears a crown.

(f) He can't be wrong whose life is in the right.

(ii) Contraposit (a); give the obverse of the converse of (c); state the proposition that can be inferred from the falsity of (d); and also state what inference can be drawn about "those whose life is not in the right" from (f), and show how you will draw this inference.

IV. What objections have been raised to Aristotle's *Dictum de omni et nullo* as the supreme principle of syllogistic reasoning? Does any amendment proposed satisfy these objections?

Is the Hypothetical Syllogism a case of mediate or immediate reasoning?

V. (i) When is a syllogism said to be in a weakened conclusion? Why is there no weakened conclusion in figure three? Would you regard *Bramantip* in the fourth figure as an example of a weakened conclusion?

(ii) Prove by the general syllogistic rules that in the second figure the major premise must be universal and that in the fourth figure the conclusion cannot be an universal affirmative.

VI. (i) Examine the grounds on which the fourth figure has been rejected by some logicians and state the use of this figure.

(ii) State the following argument in the syllogistic form and reduce it directly to the first figure:—

Some men of intellectual attainments are not worthy of honour; for every individual useful to society possesses intellectual attainments, while not every man useful to society is worthy of honour.

VII. Distinguish between the ordinary and the Goclenian Sorites. State and prove the rules of the Goclenian Sorites.

Analyse and test the following train of reasoning :—

Misfortune which befalls some is good, for whatever perfects the soul is good, just as whatever promotes happiness is good.

VIII. How far are we justified in regarding the syllogism as the exclusive form of deductive reasoning?

What exactly is the function of the minor premise in the syllogism?

---

1895.

I. (i) What is meant by the Connotation and Denotation of names? How does a General Name differ from a Proper Name and from an Abstract Name?

(ii) Names are said to be names of things, and not of our ideas of things. What account would you give of names like "centaur," to which in a sense there are no things that correspond?

II. Enumerate and define the Five Predicables. Show their connection with the doctrines of Division and Definition on the one hand, and with the distinction between Verbal and Real Predication on the other.

III. (i) State the following propositions in logical form; and give the Converse and Contrapositive of each: (a) A man who has friends must show himself friendly. (b) Industry is the only quality that he needs to ensure his success.

(ii) Give the contrary and the contradictory of the propositions in (i); and also of the following: (a) It is not always that a man sees where his duty lies. (b) Wisdom is better than rubies.

(iii) "If one premise is particular, so must be the conclusion."

Does it follow from this that if the conclusion is universal, both the premises must be universal?

IV. (i) What is the reason for the rule that the middle term must be distributed once at least in the premises? Explain why the Second Figure can yield only negative conclusions, and the third only particular conclusions.

(ii) Show, (a) that a universal affirmative conclusion can be proved only in the First Figure; (b) that a particular negative cannot stand as premise in the First and Fourth Figures; and (c) that in the Fourth Figure, if the minor premise is negative, both premises must be universal.

V. (i) Distinguish between Weakened Syllogisms and Strengthened Syllogisms. Give an example of each from the Fourth Figure. (ii) What is an Indirect mood? Show how the moods of the Fourth Figure may be accounted for as Indirect moods of the First.



VI. State the leading theories which have been held regarding the Import of Propositions. Show by a reference to its doctrines, the theory of predication which underlies the procedure of Formal Logic.

VII. Discuss the question whether in Logic we ought to regard the alternatives in a disjunctive judgment as mutually exclusive or not. Show how the analysis of the Disjunctive Syllogism depends on the answer given to this question.

VIII. (i) State the following argument in syllogistic form, naming the Figure and Mood: (i) "Few men are patriots, because few men possess the quality which is essential to patriotism, *viz.*, disinterestedness." (ii) Construct a syllogism in Bokardo to prove that "fallibility is not the same thing as folly." Reduce the syllogism both directly and indirectly to the First Figure.

(ii) Reduce the following dilemmatic argument to logical form.

"Do men then apply themselves earnestly to things which are bad? By no means. Well, do they apply themselves to things which are indifferent? Not to these either. It remains, then, that they employ themselves earnestly only about things which are good."

IX. It has been said that Mill's proof that a syllogism is a *Petitio Principii* is in itself an *Ignoratio Elenchi*. State the grounds on which Mill regards the syllogism as a *Petitio Principii* and examine his argument in the light of the above criticism.

---

### 1896.

I. (i) Distinguish between *general*, *singular*, and *proper* names. Define an *abstract* name. Can abstract names be distinguished according as they are general or singular? (ii) Explain what is meant by the connotation and denotation of names. Examine the grounds on which it is held that proper names have no connotation.

II. (i) What is an 'essential' attribute? Distinguish an essential attribute (*a*) from a property, (*b*) from an accident. (ii) Is a proposition to be regarded as verbal when it affirms of a class an attribute common to all the members of the class?

III. (i) State the ordinary doctrine of opposition. Enquire whether it is applicable to hypothetical and disjunctive propositions. (ii) Quantifying the predicate, and, taking 'some' to mean 'some at most,' shew (*a*) how many distinct propositional forms there are; and (*b*) in what relations of opposition these stand to each other.

IV. (i) Show what propositions must be true if the following propositions respectively are false: (*a*) Actions are either good,

bad, or indifferent. (b) He is vain, selfish and headstrong. (c) He is supported by all his personal friends, and by no others.

(ii) Explain the nature of Conversion, Obversion, and Contraposition by reference to the following propositions: (a) The angles of a triangle are together equal to two right angles. (b) There are men who are incapable of generosity. (c) If Government servants are underpaid it is certain that they will accept bribes.

V. (i) Given that the conclusion of a syllogism is universal, prove that the premises must be universal. (ii) Show that if the middle term of a syllogism is distributed twice, the conclusion must be particular. (iii) Deduce from the syllogistic rules all the ways in which it is possible to prove the conclusion, no S is P.

VI. (i) State and prove the rules of the First Figure and determine its Moods. (ii) Determine the Mood and Figure of a syllogism in which the major is distributed in the premises and not distributed in the conclusion. (iii) Suppose that S, M and P are the minor, middle and major terms respectively of two valid syllogisms in the same Figure, show that if the minors are contradictories, the conclusions cannot be contradictories.

VII. (i) Explain the nature of Reduction in both its forms, direct and indirect. Is Reduction an essential part of the doctrine of the syllogisms? (ii) Given two syllogisms, each with a universal conclusion, show that the one cannot be reduced to the other by the indirect method.

VIII. (i) "To talk in such a way is foolish, and none but ignorant men would do it." Does it follow that none but ignorant men are foolish?

(ii) "The men who were left behind were either old or wounded, though more were both. All the wounded were left behind." State these premises, with the conclusion they yield, in syllogistic form.

(iii) "He must either go to prison or pay the fine. On the other hand, if he does pay the fine, he will be ruined." What is the conclusion? Exhibit the reasoning in the form of a dilemma.

IX. Give examples of valid deductive inferences that cannot be reduced to syllogistic form. How are these related to syllogistic inference?

---

### 1897.

I. What is the nature and province of Logic if it is regarded as the "Science of the conditions on which right concepts, judgments, and reasonings depend"?

II. State the leading views regarding the nature, origin, and place in a treatise on Logic of what have been called the Laws of Thought.

III. In what different senses have the terms connotation and denotation been used? Can the distinction of *singular* and *general* be applicable to abstract terms? State briefly, with reasons, whether *singular abstract* and *general abstract* terms are connotative or non-connotative. Give the logical characteristics of the following terms:—*faith, convenience, the brightness of this light, deaf*.

IV. What is the logical significance of singular propositions?

*Every human being is not happy*; Obvert.

*All virtuous men are happy*:—State the propositions that can be inferred from it, (1) as true, (2) as false.

*Only human beings distinguish between right and wrong*. Give the Converse and the Contrapositive.

V. State and criticise the doctrine of the quantification of the predicate. What theory of Predication is consistent with this doctrine?

VI. Discuss the grounds on which reduction is considered to be an essential part of the doctrine of the syllogism.

Distinguish between direct and indirect reduction. How can *Celarent* be reduced to *Darii*?

VII. Write the following arguments, in syllogistic form and reduce them to figure I. (1) Ramaswami is a Congress-wallah and is loyal to the British Government. Therefore some Congress-wallahs are loyal to the British Government. (2) All who are punished should be responsible for their actions. Therefore if some lunatics are not responsible for their actions they should not be punished. (3) All who have passed the B.A. degree examination have a knowledge of English literature: hence Peshu cannot have passed the B.A. degree examination for he has no knowledge of English literature.

VIII. Prove in general language: (i) That there is no inference from two particular premises. (ii) That if one premise is particular so must be the conclusion. Can there, in any case, be an exception to either of these rules?

IX. Distinguish between a Constructive and a Destructive hypothetical syllogism and shew how the one may be reduced to the other.

---

1898.

I. The following objections have been urged to the utility of syllogism. Examine them: (i) "If syllogism must be taken for the only proper instrument of reason, it will follow that before Aristotle there was not one man that did or could know anything by reason; and that since the invention of syllogism there is not one in ten thousand that doth." (ii) "The conclusion of a syllogism is no real

inference." (iii) "The conclusion of a syllogism is a glaring case of *petitio principii*."

II. Distinguish between logical division and other kinds of division with which it is liable to be confounded. State the different principles on which Proposition is divided, and give the sub-divisions under each head.

III. Distinguish between the different views advanced regarding the Import of Predication, and state, with reasons, the view you think most satisfactory. Which view is adopted in the ordinary Logic?

IV. What, according to Aristotle, is the need for the reduction of syllogism? What improvement in Logic in more recent times has rendered reduction unnecessary? Reduce *Bokardo* (1) *per impossibile*, and (2) ostensibly.

V. Examine the correctness or otherwise of the following statements: (1) The so-called hypothetical syllogism is simply a case of immediate inference. (2) In no way can a syllogism with two singular premises be viewed as a genuine deductive inference.

VI. 1. No one who is without a sense of honour can be influenced by public opinion. Diogenes is not endowed with a sense of honour, and therefore he cannot be influenced by public opinion.

2. Only if there be good rains there will be a good crop. Now, since there are no good rains, there will be no good crop. Each of the above syllogisms seems to violate a rule. State the rule, and examine where the violation of it be real or only apparent.

VII. 1. In Fig. 3, why must the minor premise be affirmative.

2. In Fig. 4, why must neither premise be O.

3. Why cannot A be proved in any Figure but the First.

4. Show that, if the conclusion of a syllogism be universal, the middle term can be distributed only once in the premises.

5. Show that, in certain moods the middle term is over distributed.

VIII. 1. All chrystals are solids.

2. Only animate beings are sentient.

3. If a stone is diamond, it is combustible.

Educe from each of the above its converse, its contrapositive and its inverse.

IX. Point out the defects of Euler's system of logical notation. Describe a system of logical notation which is free from these defects.

X. Express the following in syllogistic form and examine their validity :—

1. C is not D, for A is B, and I know that whenever A is not B, C is D.



2. To be wealthy is not to be healthy; not to be healthy is to be miserable; therefore to be wealthy is to be miserable.

3. Old age is wiser than youth; therefore it is reasonable that we should be guided by the opinions of our ancestors.

XI. Some logicians lay it down as a rule that the mutual exclusiveness of the alternatives of disjunctive proposition, where such exclusiveness exists, depends, with one exception on the matter and not the form. Explain the meaning of this rule and indicate the exception. In accordance with the above rule, work out each of the following disjunctive major premises to all its valid conclusions:—

1. A successful student is either industrious or clever.

2. As X's name does not appear in the passed list, he must either have failed, or failed to appear.

XII. What is the characteristic liability to error of the dilemma? Examine in connection with your answer the validity of the following: If pain is severe it will be brief, or if it is long continued it is light. But pain must be either brief or light, and is therefore to be borne with equanimity.

### 1899.

I. To what extent do you consider that questions "Truth" are relevant in Formal Logic? State briefly the relation that Induction bears to Deduction, and discuss the appropriateness of applying the terms *synthetic* and *analytic* to Deductive and Inductive reasoning respectively. Illustrate your answer.

II. What difficulties are there in classifying Names into Abstract and Concrete? Is the distinction of Names into connotative and non-connotative applicable to Abstract names? Give the logical characteristics of *nation*, *individuality*, *foreign* and *substratum*.

III. What is meant by a Category? Why should the question of the Category be dealt with in Deductive Logic? State and criticise the scheme of categories of either Aristotle or Mill.

IV. How far does the doctrine of opposition apply to conditional and disjunctive propositions? What relationship exists between I and O if "some" is taken to mean "some at least" and "some at most"? Shesu declares that only Hindus observe caste; Raman denies that all those who observe caste are Hindus; Govindu affirms that all Hindus observe caste. Discuss the mutual relations of these propositions.

V. 1. What is an eduction? State and exemplify the different kinds of conversion.

2. (a) *With man many things are impossible*:—Convert.

(b) *No persons destitute of imagination are true poets*:—Obvert.

(c) *No young man ever fails to get on in life if only he is intelligent and industrious* :—Contraposit.

(d) *All human actions are foreseen by the Deity* :—Draw an inference about actions that are not human.

(e) *He need not be poor though he is shabby, for many rich men go in rags* :—Express in the form of an immediate inference.

VI. Discuss the validity of the fourth figure. Shew that in none of the four figures will the combination of either premise with the conclusion in a valid syllogism establish the other premise.

VII. "Reduction makes evident the essential unity of all forms of syllogistic inference and systematizes the theory of syllogism." Explain. Some intelligent students do not succeed in their examination for though every successful student is really industrious, it is not true that every intelligent student is industrious. Express the above argument in the proper syllogistic form and reduce it to the first figure.

VIII. What do you understand by a Mixed Syllogism? Enumerate the different classes of Mixed Syllogism "Every principle of sound reform is either based on reason or it is of no practical value; the prevention of infant marriage has proved useful; therefore this reform is rational." Reduce the above to the conditional and categorical forms; and in the case of the latter state the figure and mood.

IX. Discuss the nature of the reasoning contained in the following :—

(1) It is impossible to prove that segregation is justifiable if you cannot prove that some preventive measures are justifiable and segregation has proved a very effective preventive.

(2) The moral world is far from so well governed as the material, for the former, although it has its laws which are invariable, does not observe these laws so constantly as the latter.

---

### 1900.

I. Explain carefully how the problem of Logic differs from that of Psychology. Examine the grounds on which the utility of Logic has been impugned.

II. What is a concept? Explain what is meant by the intension and extension of concepts, and examine the doctrine that intension and extension stand in inverse ratio to each other.

III. (1) What are the simplest propositions that must be established in order to disprove the following :—

(a) All is not lost;

(b) Some knowledge is not of any value;

- (c) The virtuous alone are happy ;  
 (d) Many are called, but few chosen.
- (2) Supposing that no good man is unhappy, what can you predicate about
- (a) Unhappy men ;  
 (b) Happy men ;  
 (c) Bad men ?

(3) Can you logically conclude that if a truthful man is trusted, an untruthful man is distrusted ?

IV. Explain the distinction between direct and indirect moods, and show how the moods of the fourth figure may be accounted for as indirect moods of the first.

V. (1) Prove that when the major term is predicate in its premise, the minor premise must be affirmative.

(2) If the major term is distributed in its premise and undistributed in the conclusion determine the figure and the mood.

(3) Show why all the premises except the first in the Aristotelean Sorites must be universal.

VI. What is the object of Reduction ? Is it an essential part of the doctrine of syllogism ? Construct a syllogism in Bokardo and one in Ferison, proving the conclusion that "All is not gold that glitters." Reduce the syllogisms both directly and indirectly, to the first figure.

VII. Show how the Aristotelean doctrine of Figure and Mood is affected by the doctrine of Quantification.

VIII. Define a Dilemma, and give the various forms of Dilemma which your definition admits. Put the following Dilemma into logical form:—What is the use of giving advice ? If you advise a man what he means to do, your advice is superfluous, in any other case, it is ineffectual.

IX. Discuss the logic of the following arguments:—(1) If only the ignorant despise knowledge, this man cannot be ignorant for he praises it. (2) Without order there is no living in public society, because in want thereof is the mother of confusion, whereupon division of necessity followeth; and out of division, destruction. (3) None but the wise are good, none but the good are happy, therefore none but the wise are happy. (4) What is the use of all this teaching ? Every day you hear of a fraud or forgery by some one who might have had an innocent life, if he had never learned to read and write.

---

1901.

I. Logic may be said to be concerned with Thought only in so far as it is Real. Examine this view of Logic, bringing the chief

points where Logic passes into Psychology on the one hand, and into Metaphysic on the other.

II. Either proper names do call up in our minds some individual object, in which case they at once re-call its qualities, or they are merely sounds which are not worthy to be called proper names at all. Discuss this.

III. (a) From the proposition 'Herbert Spencer is the greatest living Philosopher' can we be said to *infer* that 'The greatest living Philosopher is Herbert Spencer,' and if not, why not?

(b) 'If a religion is real, its followers welcome scientific inquiry.' Give the Contradictory.

(c) 'If Science is Philosophical, it finds room for religious experience.' Give the Contrary.

(d) 'Without consistency there can be no truth.' Educe as many other propositions as you can.

IV. Sa P has been interpreted to mean :—(a) P is the attribute of S. (b) S is included in P. (c) S = SP. (d) S is P, if M. Which do you consider the true view, and why?

V. (a) Show that no premise can be proved from the conclusion and the other premise.

(b) What do we know of the subject of the major premise, when the minor denies?

(c) Examine the following :—A good monsoon means good crops. So there must be great scarcity this year on account of the failure of the monsoon.

VI. Determine the valid moods of Fig. 2 by reference to the Rules of Syllogism. "Much so-called scientific opinion regarding a future life is discredited to-day, for it is no longer consistent with the facts of experimental psychology." Throw this into Fig. 2, and reduce direct to Fig. 1.

VII. The extension of knowledge by syllogism is more seeming than real, for we only take out in the conclusion what we have put into the premises. Examine this.

### 1902.

I. Logic is spoken of as a *Regulative Science*. What are the characteristics of a *Regulative Science*? How does Logic as a regulative science differ from Aesthetics and Ethics?

Is the function of Logic *proof* or *discovery*?

II. Show that the controversy about the import of propositions turns really upon a difference of opinion as to the *scope* of Logic.

III. Distinguish between Contradictory and Contrary terms, and show that this distinction is more valuable from a logical point of view than that between Positive and Negative terms.



IV. Prove the legitimacy of Conversion without taking for granted the rules of conversion.

(a) *Only some men are wise* :—Contraposit.

(b) *Truth will prevail* :—Give the obverse of its contradictory.

(c) *Few men think, but all have opinions* :—Express this in a single proposition and give the contradictory of its obverse.

V. Examine the psychological basis of Mill's theory of the syllogism.

On what grounds has the validity of the Fourth Figure been disputed?

Some men who get on in life are really not talented, for every one who pushes himself forward gets on in life, though everyone who pushes himself forward is not talented :—State this argument in a syllogistic form and reduce it to the First Figure.

VI. Logicians are divided in their view as to the interpretation of the conjunctive "either, or" in the disjunctive proposition. What interpretation would you accept and why?

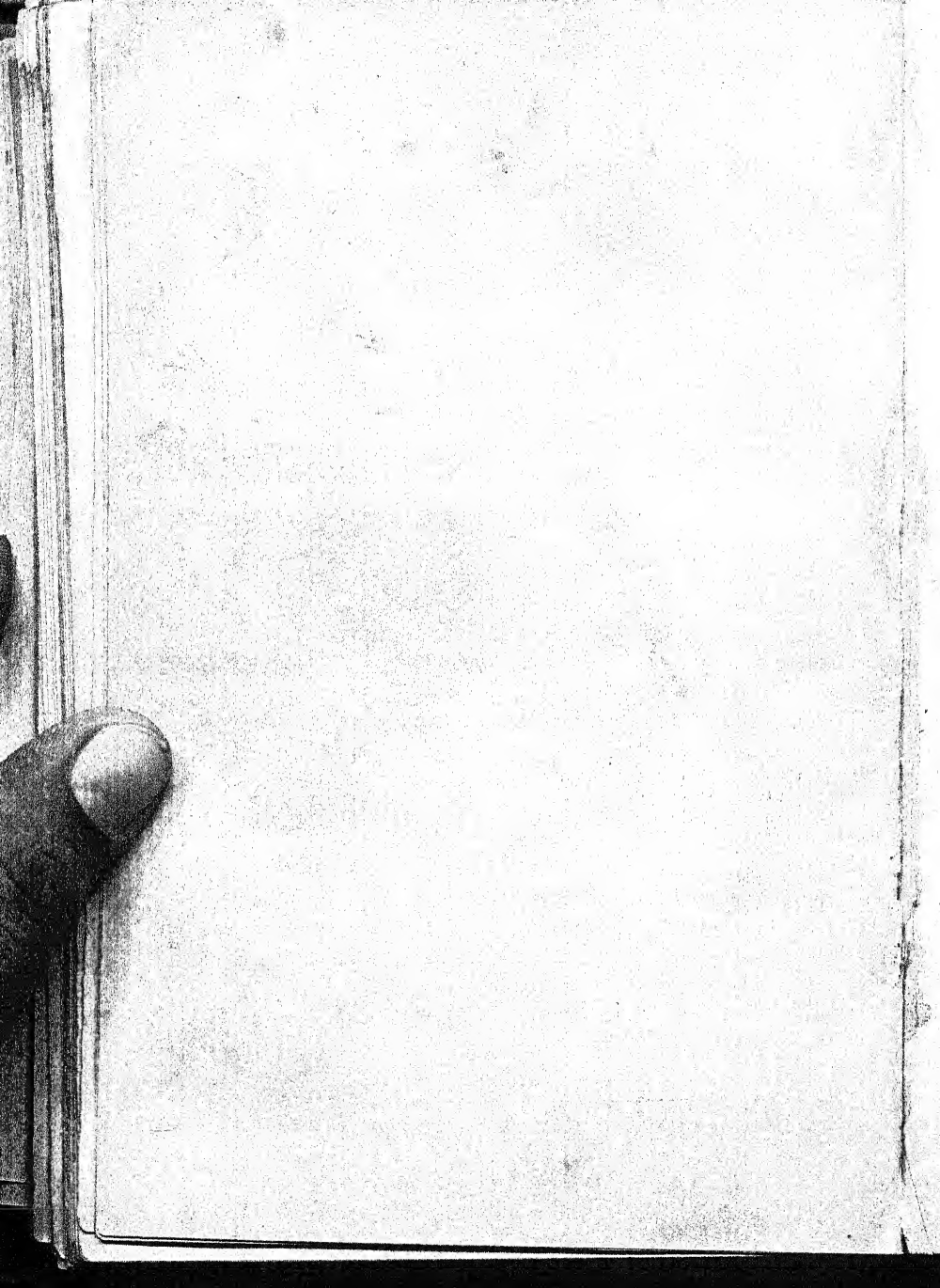
State and illustrate the different forms of the Disjunctive Syllogism and reduce them to the corresponding Hypothetical forms.

VII. Examine the validity of the following arguments :—

(a) If philosophical theories are true some at least ought to be accepted by a majority of thinkers; but as not a single theory fulfils this condition, no philosophical theory can be true.

(b) No mere education and training will make one a poet, and none but those who receive education and training can become scientists, and hence it is impossible for one to be both a poet and a scientist.

(c) All rich men are influential; all influential men are not just in their dealings; some men who are not just in their dealings are not respected; therefore some rich men are not respected.



# LOGIC—DEDUCTION

BY

A. SUBRAHMANYAM, B.A., L.T.,

*Assistant Professor of Mental and Moral Science, Presidency  
College, Madras.*

Crown 8vo, pp. 447—bound in cloth. Price Rs. 3-0-0.

---

## OPINIONS.

S. Satthianadhan, Esq., M.A., LL.D., F.S.S., Professor of Mental and Moral Science, Presidency College, Madras :—  
“Mr. A Subrahmanyam's work on Deductive Logic is, in my opinion, admirably adapted as a Text-book for Indian students preparing for the B.A. degree examination. It is complete in itself as it deals in an able manner with all the questions bearing on the subject, including some of the latest additions to Formal Logic, such as, the quantification of predicate, Dr. Veun's scheme of notation, De Morgan's development of the syllogism, &c. The views of the leading schools of Logic are given, but what gives special significance to the work is the critical examination of these views in which the author displays considerable originality. The chapters on “the Import of Propositions” and on “Functions and Value of the Syllogism” are instances in point. Such a work which bears, on every page of it, evidence of a masterly handling of the subject is a credit to educated Indians.”

D. Duncan, Esq., M.A., D.Sc., LL.D., lately, Director of Public Instruction, Madras :—“Your treatment of the subject seems exhaustive and he who studies your book

will have brought to his notice almost all the important questions that have been raised in connection with Deduction. In its new and improved edition, I hope it will meet with the attention which it so well deserves. I shall be glad to have it by me for reference."

Jnanranjan Banerjee, Esq., M.A., Professor of Philosophy, Logic and English Literature, and Law Lecturer, Metropolitan Institution, Calcutta :—"I have glanced at it at several points and thoroughly examined it at many important points and feel free to say that it is a useful manual giving all the information that a student of Deductive Logic may require for his examination in connection with the Indian Universities. The references to different schools of Logic and the acute criticisms which are noticeable features of the work enhance its value. It covers the same ground as the Calcutta University Syllabus for the F.A. and B.A. Examinations in Deductive Logic."

Surendra Narayan Mitra, Esq., M.A., Principal and Senior Professor of Philosophy, Rajchandra College, Barisal :—"I have gone through the main parts of your book, especially the portions dealing with the controversial points, and to my entire satisfaction I have always found that clear exposition of your own position is the chief feature of your work. An upholder of the Empirical position in Logic as you seem to be, you have tried your best, with no little success, to draw out clearly and explicitly many implications of the Empirical and Inductive position in Logic as formulated and maintained by J. S. Mill, the best modern exponent of the Empirical view, so far as that is demanded in a text-book of Deductive Logic. The introductory portion of your book is also very useful and the portion dealing with the Deductive art very clear and exhaustive."



Rev. J. N. West, M.A., B.D., Principal and Professor of Logic, (Reid) Christian College, Lucknow:—"As yet I have only given it a superficial examination, but can say that it seems to be well arranged and well written."

Shankar Gopal Sathe, Esq., M.A., Acting Professor of Logic and Moral Philosophy, Elphinstone College, Bombay:—"I have gone over it in part and I am sure it would be found very useful by the candidates for the Intermediate Examination of this University. \* \* \* The text-book read here is Fowler's Deductive Logic, which, of course, by itself fails to meet the full requirements of a student preparing for his Examination. Your book thus would be a good companion reader to Fowler's Logic. I shall therefore very gladly recommend your book to my Junior Logic class."

Khagendranath Mittra, Esq., M.A., Professor of Philosophy and Logic, Krishnagar College:—"I have read some portions of it carefully, and they seem to promise a careful and systematic treatment of the subject. I shall certainly recommend the use of your book in my classes, and also get a copy of it for the College library. I shall be very glad to see your book placed among the text-books for the B.A. Examination of the Calcutta University."

B. K. Dutta, Esq., B.A., Professor of Logic, St. John's College, Agra:—"I am of opinion that the book is a comprehensive one, and will meet the requirements of the students of all Indian Universities. I shall introduce the book into my class from the next session."

S. Subrahmanya Sastri, Esq., M.A., Professor of Mental and Moral Science, H. H. Maharajah's College, Trivandrum:—"I find it very useful for students, and have recommended it to them."

The Madras Mail :—"Though written mainly on the lines of the syllabus in Deductive Logic as laid down by the University of Madras, the author has given to his work a sufficiently comprehensive character. He has discussed in it in lucid style all the traditional views on logical doctrine and has handled all questions of a controversial nature with a firm grasp of the views of the opposing schools of thought, bringing to bear on them, at the same time, a great deal of critical skill \* \* \* An Indian Professor like Mr. Subramania Iyer, with his large experience of the requirements of Indian students, was peculiarly well fitted to write a book such as this."

The Hindu :—"\* \* \* After some careful scrutiny we are able to say that this book is eminently adapted to fulfil the needs of the candidates for the B.A. Degree Examination. \* \* \* The author has consulted chiefly the works of Bain, Mill, Keynes and Welton. But the results of these writers have been thoroughly assimilated and presented with a great deal of lucidity to the reader. And the author shows that he is no slavish follower of any one of the writers referred to and that he is not obsessed by the authority of the logicians he generally follows. We may refer in illustration of the statement to the writer's remarks on the *Predicative view of Propositions*, on the nature of *verbal propositions*, the treatment of *Hypothetical propositions* generally and the discussion of the *Function and value of the Syllogism*. Something like a chivalrous feeling of loyalty to the masters under whom he studied animates the writer, and he makes a not unsuccessful defence of Mill's position on the nature of the syllogism against the objections recently advanced against it (*vide* chapter vii.). There may be talk in academic circles against the tyranny of the text-books or the sovereignty of the syllabus, but we believe

that they are very good things when properly used. They give the boys and the teachers a closer grip of the subject. \* \* \* And when the text-book is so good as that of Mr. Subramania Aiyar's on Deductive Logic we have no hesitation in commending it for class use. The book is turned out in a thorough workman-like manner and is in many ways a model of what a text-book must be."

**The Indian Review:**—"We gladly welcome the Second Edition of 'Deductive Logic' that Mr. Subramanyam has brought out. \* \* \* The author has brought to his help the labours of the latest authorities on the subject and the student has thus been enabled to obtain the requisite knowledge without the labour of 'sifting and gleaning.' In the treatment of the book he does not slavishly follow any one of the writers whose works he had consulted, though we may class him as generally belonging to the school of Mill and Bain. In the chapters on Syllogism and Propositions he has successfully maintained their position by meeting the objections raised by recent writers and by subjecting Hamilton's view of the quantification of the Predicate to proper criticism.

In short we have much pleasure in recommending this book as a Text-Book for the B.A. Classes. It meets the University requirements as it has been written in accordance with the B.A. Syllabus and is, in our opinion, moderately priced. The get-up of the book is neat and excellent, and reflects much credit on the enterprising firm of Messrs. Srinivasa, Varadachari & Co."

---

By the same Author.

# THE PHILOSOPHY OF ARISTOTLE

(Containing a copious abstract of the *Nichomachean Ethics*,  
the special portion for the B.A. Examination of 1904).

Price—Rs. 1-8-0. Postage Extra—As. 2.

## OPINIONS.

Dr. D. Duncan, M.A., lately, Director of Public Instruction, Madras:—" \* \* \* Some day I may be able to turn my attention to Philosophy again; and when that day comes, I shall peruse your book with pleasure and interest. All I can say now is that I am greatly pleased that you have taken up such a splendid subject. I trust it is the beginning of great things."

S. Satthianadhan, Esq., M.A., LL.D., Professor of Mental and Mora Science, Presidency College:—" \* \* \* I am extremely obliged to you for a copy of your book on Aristotle. I have read it through with interest. You have certainly taken much pains in preparing it, and I have recommended it to my students as they seldom have access to the standard works on the subject of which you have made so good use. \* \* \*"

Dewan Bahadur the Honourable Mr. Justice S. Subrahmanya Aiyar, K.C.I.E.:—" \* \* \* From the little I have been able to see, I have no doubt it will be a useful book."

P. Sundaram Pillai, Esq., M.A., Professor of Philosophy, Maharajah's College, Trivandrum:—" \* \* \* From what



I have seen of it I believe it will prove useful in the hands of the students. I have recommended it accordingly to my class. Hoping you will be duly encouraged in such useful publications. \* \* \*"

Rev. C. Cooper, M.A., Madras Christian College:—" \* \* \* I did recommend my students to get your book, as likely to be helpful to them. \* \* \*"

A. B. Macaulay, Esq., M.A., Madras Christian College:—" \* \* \* I shall be happy to mention your book among others in the class. \* \* \*"

W. S. Meyer, Esq., M.A., I.C.S.:—" I regret that I have not yet been able to spare the time to give your little book on Aristotle the careful attention that it deserves; but from a cursory perusal, it seems to me that it will form an excellent introduction for Indian students to the methods and ideas of the greatest thinker of pre-historic Europe."

The Indian Journal of Education:—" This book, as the title implies, lays claim to no originality, but the work of exposition of Aristotle's Philosophy Mr. Subrahmanyam has done very creditably indeed. \* \* \* We cannot but recommend heartily this work to students of Philosophy, and especially to those who are going up for their B.A. Degree Examination in January next. The author has performed the difficult task that he has undertaken with much ability."

The Hindu:—" \* \* \* In preparing this Synopsis Mr. Subrahmanyam has certainly had a very difficult task to do, and one must expect to find defects; but the few we have noted in a cursory perusal of the work hardly detract from the general excellence of his performance. \* \* \* He has certainly produced a good and useful

summary of the doctrines of the Stagirite. We have no doubt the book will prove of material help not only to students preparing for the University Examinations, but also to all who are interested in the study of Philosophy."

---

## THE STUDY OF PHILOSOPHY

By DR. S. SATHIANADHAN, M.A., LL.D.,  
Professor of Mental and Moral Science, Presidency College, Madras, Fellow of  
the University of Madras and Examiner in Mental and Moral Science at the  
University of Madras.

Price Rs. 2-0-0.

---

*BY THE SAME AUTHOR.*

## THE HAND-BOOK OF PSYCHOLOGY.

Price Re. 1-0-0.

APPLY TO

SRINIVASA, VARADACHARI & CO.,  
Triplicane, Madras.

